

**ATLAS OF ANATOMY AND SURGICAL APPROACHES
IN ORTHOPAEDIC SURGERY**

ATLAS OF ANATOMY AND SURGICAL APPROACHES IN ORTHOPAEDIC SURGERY — UPPER EXTREMITY

By

RODOLFO COSENTINO, M.D

*Assistant Professor in Orthopaedic Surgery University
of La Plata Argentina*

*Research Associate Department of Orthopaedic Surgery
State University of Iowa Iowa City*

With a Preface by

ARTHUR STEINDLER



CHARLES C THOMAS PUBLISHER

Springfield Illinois U.S.A

S.M.S MEDICAL COLLEGE,
LIBRARY, JAIPUR.

CHARLES C THOMAS PUBLISHER
BANNERSTONE HOUSE
301-327 East Lawrence Avenue, Springfield, Illinois, U.S.A.

Published simultaneously in the British Commonwealth of Nations by
BLACKWELL SCIENTIFIC PUBLICATIONS, LTD., OXFORD, ENGLAND

Published simultaneously in Canada by
THE HENSON PRESS TORONTO

This book is protected by copyright. No part
of it may be reproduced in any manner with-
out written permission from the publisher

© 1960, by CHARLES C THOMAS PUBLISHER
Library of Congress Catalog Card Number 59-14917

With THOMAS BOOKS careful attention is given to all details of
manufacturing and design. It is the Publisher's desire to present books
that are satisfactory as to their physical qualities and artistic possibilities
and appropriate for their particular use. THOMAS BOOKS will be true
to those laws of quality that assure a good name and good will.

Printed in the United States of America

*To my wife, Leonor Olga, and to our sons
Rodolfo Victor and Pablo*

Preface

Dr Cosentino's treatise on Anatomy and Approaches of orthopaedic operative procedures is more than a mere addition to the already existing texts of this kind

There is I believe a real point of distinction in the fact that it is all reality and not schematization. Layer by layer from the skin incision to depths of the articular or bony structures, the actual anatomic situation is revealed with uncommon accuracy and with painstaking presentation of all nervous and vascular structures. The elimination of all diagrammatic drawings is well considered. Line drawings depict what is to be done in situ as the actual operative area is reached and only too often convey the false impression of simplicity of the procedure.

It is assumed in Dr Cosentino's treatise that the operator knows what he wants to do when he gets there: a resection, an osteosynthesis, etc. But it is the road to it which counts most and which is the principal object of this book: a book on anatomy and approaches. With the completion of the approach and the wide exposure of the operative field this goal is reached.

To accomplish this objective it requires a person who is both a finished orthopaedic surgeon and a superb anatomist. Dr Cosentino is both. I cannot but admire the skill and infinite patience which Dr Cosentino applies to his anatomical dissections and which I had many occasions to observe.

It is emphasized again that this is not a work on orthopaedic operations with its profusion of methods and technique. This is rather a treatise on the anatomy and the approaches for whatever method is ultimately used in situ.

This is an endeavour to standardize the road to the operative field rather than the operation itself.

Iowa City

ARTHUR STEINDLER

Introduction

The first volume of the *Atlas of Anatomy and Surgical Approaches in Orthopaedic Surgery* deals with the *Upper Extremity* while the second and third volumes will be devoted to the *Lower Extremity* and *Neck and Back*, respectively. No claims are made to dwell on details of acknowledged surgical techniques for specific operations. My only purpose is to demonstrate with accuracy the anatomical structures encountered by the operator from layer to layer.

The direct photographic reproductions of the anatomical preparations offer a clear picture of the structures of the specific areas and should serve the surgeon to avoid injuring anatomic elements as he explores the region.

Unnecessary duplications of photographs are avoided. For instance, reproductions concerning the elbow region are not repeated when dealing with the arm or forearm.

The surgeon is restrained by biological principles of tissue regeneration and repair and cannot expose the anatomical structures as widely as is done by the anatomist. However, the surgeon cannot afford to ignore the relationships of the important structures in the operative field. To expose adequately the operative field and to better demonstrate the anatomical structures often was necessary to enlarge incisions and to extend periosteal strippings beyond the operative requirements. In this respect our dissections are anatomic rather than surgical.

The approaches presented are those generally utilized in the field of orthopaedic surgery. Simple approaches of easily accessible structures are omitted.

Radiographies have been included to show the relationship of the skin incision to the underlying skeletal structures.

Iowa City

R. COSENTINO, M.D.

Acknowledgments

This Atlas has been compiled at the suggestion of Dr Arthur Steindler. The Orthopaedic Research and Education Foundation provided funds to establish an anatomic-surgical museum at the Orthopaedic Department, State University of Iowa. I dissected the specimens for this museum. The illustrations of this Atlas are photographs of these specimens.

I am indebted for valuable suggestions to Drs Arthur Steindler, Carroll B. Larson, I. V. Ponseti, M. Bonfiglio, W. B. Gelman, and Adrian Flatt. I greatly appreciate the help of Delia J. C. Carnicelli with the manuscript and of Dr Gelman for the tracings of the incisions in the photographs. Dr W. R. Ingram and Dr E. W. Scheldrup of the Anatomy Department were most helpful in providing a room and specimens for the dissections. Mr James A. Kent and Mr S. Jack Davis took the photographs; their skill and patience are greatly appreciated. My thanks are due to the publishers, Mr Charles C. Thomas and Mr Payne Thomas.

I gratefully acknowledge the teachings I received at the University of La Plata, Argentina, by Dr R. R. Lambre, Head of the Department of Anatomy, and Drs F. E. Christmann, F. Arena, and S. Gorostrigue, who introduced me to the field of Orthopaedic Surgery.

Iowa City

R. COSENTINO, M.D.

Contents

	Page
Preface	vii
Introduction	ix
Acknowledgments	xi
Anatomy of the shoulder region	3
Superficial dissection of the pectoral region	4
Anterior aspect of the axilla	5
Posterior and medial walls of the axilla and neuro-vascular bundle	6
Neuro-vascular bundle of the axilla	8
Muscles of the posterior aspect of the shoulder	9
Posterior aspect of the shoulder	11
Supraspinous region	14
Shoulder joint and subacromio-deltoid bursa, Sensory supply	15
Ligaments of the shoulder joint	16
Approaches to the shoulder joint region	17
Anterior approach to the shoulder joint region	19
Posterior approach to the shoulder joint region	30
Anatomy of the arm	37
Anterior aspect of the arm	38
Posterior aspect of the arm	40
Lateral aspect of the arm	44
Medial aspect of the arm	46
Approaches to the arm	51
Lateral approach to the middle third of the humerus	53
Posterior approach to the humerus	56
Approach to the neuro-vascular bundle at the upper third of the arm	61
Anatomy of the elbow	65
Anterior aspect of the elbow Superficial layer	66
Anterior aspect of the elbow Deep structures	68
Anterolateral aspect of the elbow	70
Posterolateral aspect of the elbow	72
Medial aspect of the elbow	76

Approaches to the elbow joint region.....	
Anteromedial approach	
Anterolateral approach	
Lateral approach	
Medial approach	
Posterior approach	
Anatomy of the forearm	
Anterior aspect of the forearm	
Anteromedial aspect of the forearm	
Posterior aspect of the forearm	
Posteromedial aspect of the forearm	
Approaches to the forearm	
Anterolateral approach to the middle and distal third of the radius	
Posterior approach to the middle and distal portion of the radius	
Anatomy of the wrist and hand	
Dissection of the wrist palm and digits	
Anterior aspect of the wrist	
Dorsal aspect of the wrist and hand	
The radial aspect of the wrist	
Anterior ligaments of the radio-carpal, carpal, and carpo-meta-joints	
Dorsal ligaments of the wrist	
Approaches to the wrist joint region	
Posterior approach to the wrist joint	
Approach to the scaphoid	
Resection of the distal epiphysis of the ulna	
Anatomy of the hand	
Thenar and hypothenar muscles. Long flexor tendons of the hand	
Lumbricals. Fibrous flexors sheaths	
The thenar region	
Ulnar aspect of the ring finger	
Radial aspect of the ring finger	
Dorsal aspect of the ring finger	
Approaches to the hand	
Resection of the palmar aponeurosis	

**ATLAS OF ANATOMY AND SURGICAL APPROACHES
IN ORTHOPAEDIC SURGERY**

ANATOMY OF THE SHOULDER REGION

SUPERFICIAL DISSECTION OF THE PECTORAL REGION



Fig 1—SUPERFICIAL DISSECTION OF THE PECTORAL REGION

Observe

- a—The clavicular and sterno-costal heads of the Pectoralis major muscle.
- b—The Cephalic vein and the Deltoid branch of the Acromio-thoracic artery in the infraclavicular or delto-pectoral triangle

ANTERIOR ASPECT OF THE AXILLA

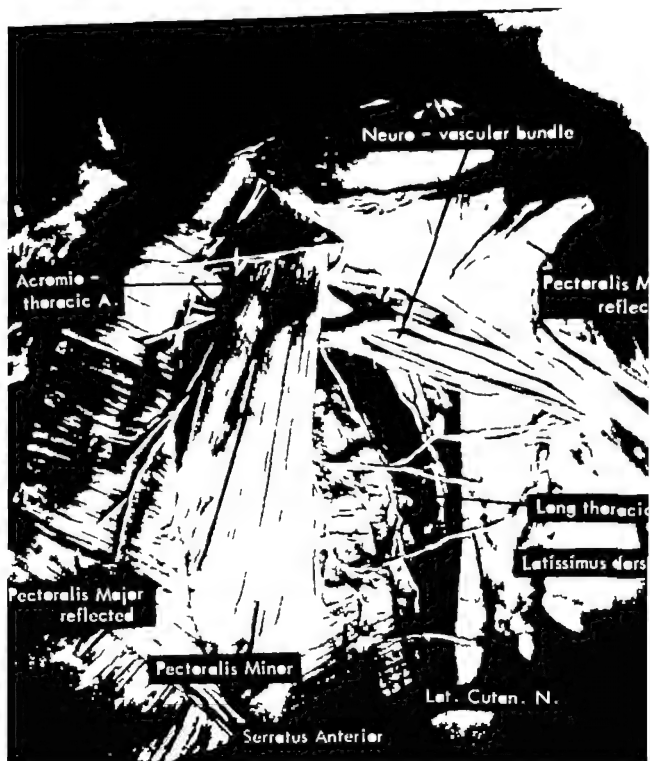


Fig. 2—ANTERIOR ASPECT OF THE AXILLA

The Pectoralis major was cut and reflected observe its insertion into the lateral lip of the bicipital groove of the humerus by means of a bilaminar tendon united along its inferior border

Observe the Pectoralis minor muscle the Cephalic vein and the Deltoid branch of the Acromio-thoracic artery cross in front at its highest portion.

The neuro-vascular bundle is seen behind the Pectoralis minor

POSTERIOR AND MEDIAL WALLS OF THE AXILLA AND NEURO-VASCULAR BUNDLE

Fig. 3—POSTERIOR AND MEDIAL WALLS OF THE AXILLA AND
NEURO-VASCULAR BUNDLE

The Pectoralis major and minor muscles were cut and reflected

The posterior wall of the axilla is formed by the Subscapularis, Teres major, and Latissimus dorsi muscles. Observe the nerve to the Latissimus dorsi muscle and its relation with the Subscapular artery

The medial wall of the axilla is formed by the Serratus anterior muscle. Observe its Long thoracic nerve. The Lateral cutaneous nerves run parallel to the muscle fibers

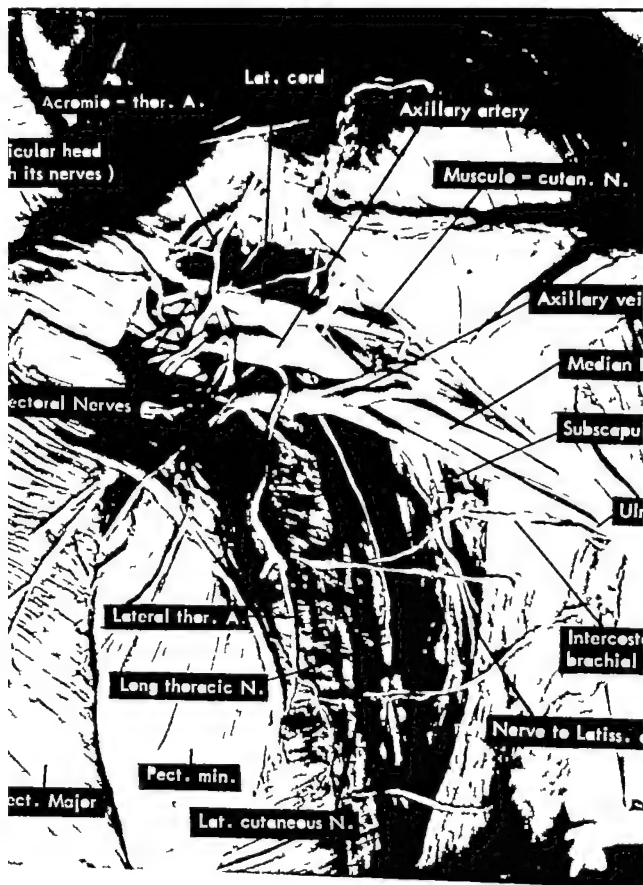
Observe the anastomosis between the posterior branch of the Lateral cutaneous nerve of the third Intercostal nerve and the Intercosto-brachial nerve.

The Axillary artery is surrounded by veins and nerves. The Axillary vein lies on the medial side of the artery and receives the veins corresponding to the branches of the Axillary artery the Cephalic vein, and the comitantes veins of the Brachial artery. The Lateral cord lies laterally to the Axillary artery after giving the Musculo-cutaneous nerve, passes in front of the Axillary artery to join the Medial cord and form the Median nerve.

Note the branches arising from the Axillary artery. Acromio-thoracic, Lateral thoracic, Anterior humeral circumflex (with a small branch to the Median nerve) and Subscapular artery (with its branch the Circumflex scapular artery)

Observe the Pectoral nerves forming a loop in front of the Axillary artery and extending to the Pectoralis muscles.

POSTERIOR AND MEDIAL WALLS OF THE AXILLA AND NEURO-VASCULAR BUNDLE



NEURO-VASCULAR BUNDLE OF THE AXILLA



Fig. 4—NEURO-VASCULAR BUNDLE OF THE AXILLA

The tributaries to the Axillary vein were removed. A part of the Axillary artery was resected.

The Medial cord is first posterolateral to the Axillary artery and passes behind the artery to be located in its medial side and join the lateral cord to form the Median nerve.

The Posterior cord lies posteriorly.

Observe the Lower subscapular nerve which also supplies the Teres major muscle.

Note the Posterior circumflex artery and the Axillary nerve going through the quadrangular space.

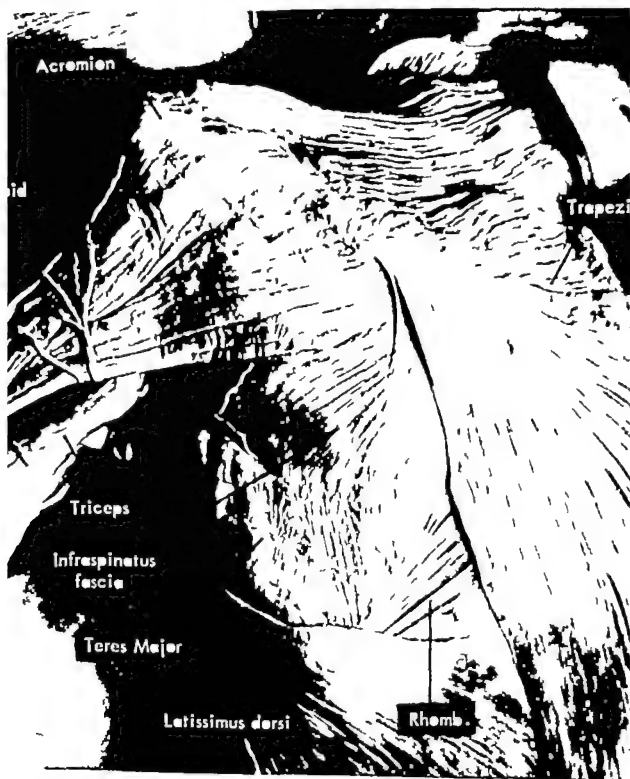


Fig 5—MUSCLES OF THE POSTERIOR ASPECT OF THE SHOULDER

MUSCLES OF THE POSTERIOR ASPECT OF THE SHOULDER

Fig. 6—MUSCLES OF THE POSTERIOR ASPECT OF THE SHOULDER

The Trapezius was cut longitudinally and reflected. Observe its motor supply (Accessory nerve) and the second layer of muscles.

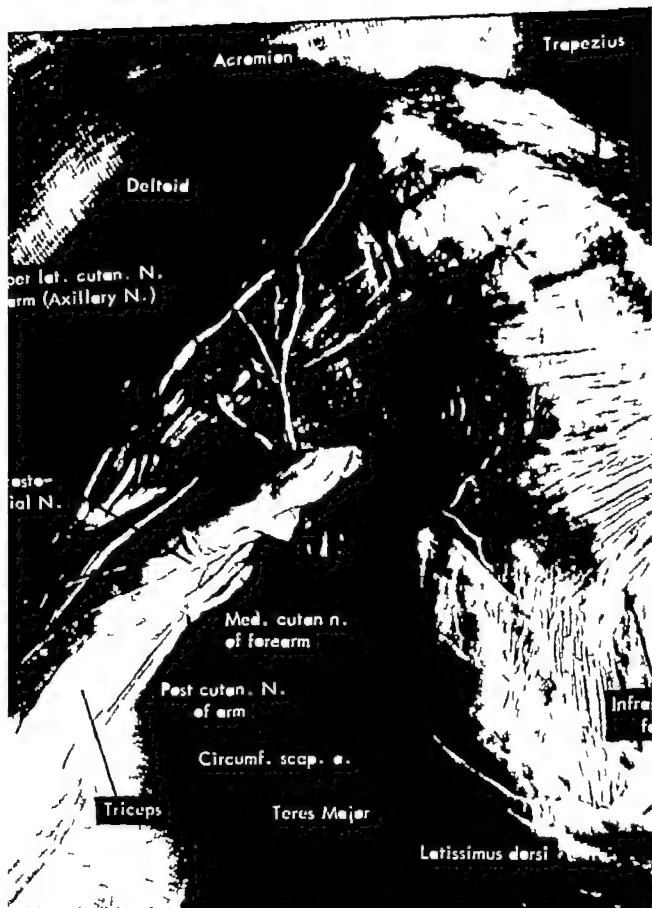


Fig 7—POSTERIOR ASPECT OF THE SHOULDER

Observe how the Latissimus dorsi muscle spirals around the Teres major muscle. The Upper lateral cutaneous nerve of the arm, branch of the Axillary nerve winds along the border of the Deltoid muscle where it becomes superficial. With the arm applied to the thoracic wall, a line dropped vertically from the acromial angle crosses the post

POSTERIOR ASPECT OF THE SHOULDER

Fig. 8—POSTERIOR ASPECT OF THE SHOULDER

The Deltoid muscle was partially cut and reflected.

Observe the long head of the Triceps passing between the Teres minor and Teres major muscles

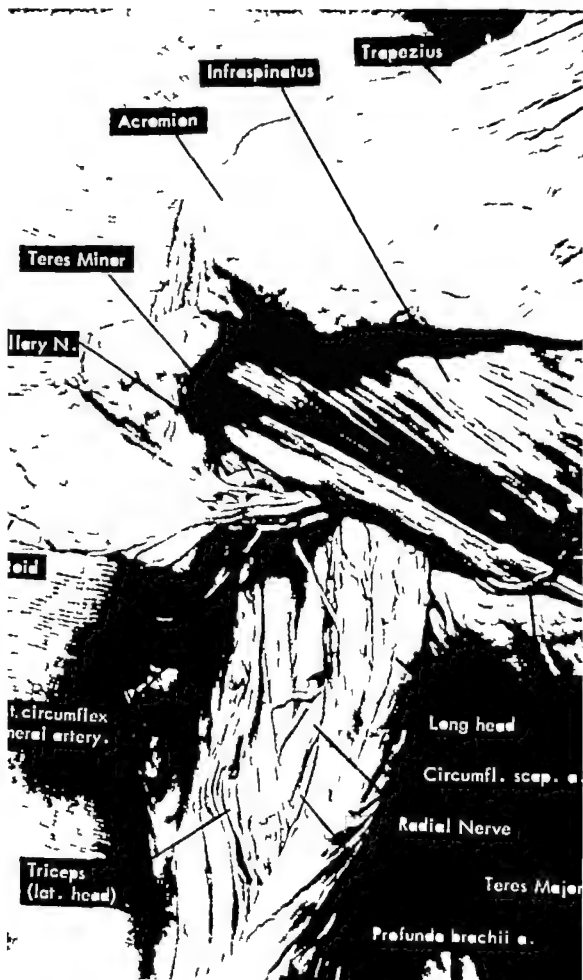
The quadrangular space is limited by the long head of the Triceps, the Teres minor the tendon of the Teres major and the surgical neck of the humerus. The Axillary nerve and the Posterior Circumflex humeral artery pass through the quadrangular space.

The Axillary nerve and accompanying artery wind round the surgical neck of the humerus. Their position on the skin surface can be determined by a horizontal line drawn two inches below the lateral border of the acromion.

The triangular space is limited by the long head of the Triceps the Teres minor and the Teres major muscles. Through this triangular space passes the Circumflex scapular artery.

The triangular space limited by the Teres major the long and the lateral heads of the Triceps gives passage to the Radial nerve and the Profunda brachii artery.

POSTERIOR ASPECT OF THE SHOULDER



POSTERIOR ASPECT OF THE SHOULDER. SUPRASPINEOUS REGION



Fig. 9—POSTERIOR ASPECT OF THE SHOULDER
SUPRASPINOUS REGION

The Trapezius muscle was separated from its insertions in the spine of the scapula and clavicle and reflected.

The Supraspinatus muscle was partially resected.

Observe

a—The Suprascapular artery crossing above the suprascapular ligament

b—The Suprascapular nerve passing through the foramen

c—The relationship between Omo-hyoid muscle and Suprascapular nerve.



Fig. 10—SHOULDER JOINT AND SUBACROMIO-DELTOID BURSA—SENSORY SUPPLY

The acromion and the clavicle were osteotomized and reflected with the Deltoid muscle.

The Suprascapular nerve sends sensory twigs to the capsule of the shoulder joint and to the subacromio-deltoid bursa

The Axillary nerve sends twigs to the joint capsule as it traverses the quadrangular space

LIGAMENTS OF THE SHOULDER JOINT

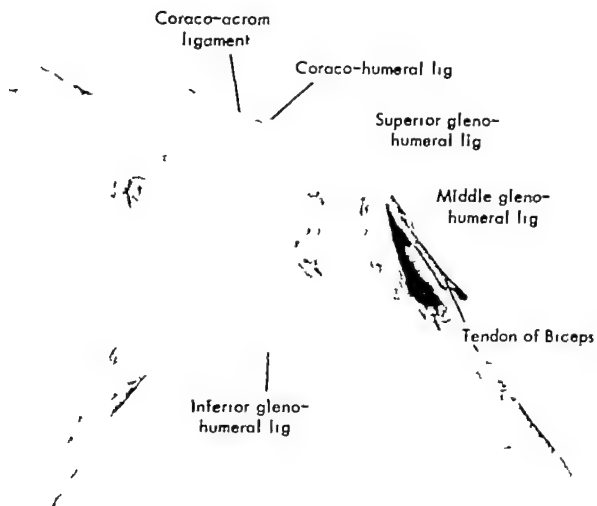


Fig. 11—LIGAMENTS OF THE SHOULDER JOINT

APPROACHES TO THE SHOULDER JOINT REGION

ANTERIOR APPROACH TO THE SHOULDER JOINT REGION



ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

I-S-shaped skin incision beginning at the anterior border of the acromion and extending obliquely to the coracoid process and then downward along the delto-pectoral groove (Fig 12)

2

Fig. 13—ANTEROPOSTERIOR ROENTGENOGRAM OF
THE LEFT SHOULDER

ANTERIOR APPROACH TO THE SHOULDER JOINT REGION



+



+

Fig. 13—ANTEROPOSTERIOR ROENTGENOGRAM OF
THE LEFT SHOULDER



II—The Cephalic vein is identified extending along the delto-pectoral groove (Fig 14)

ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

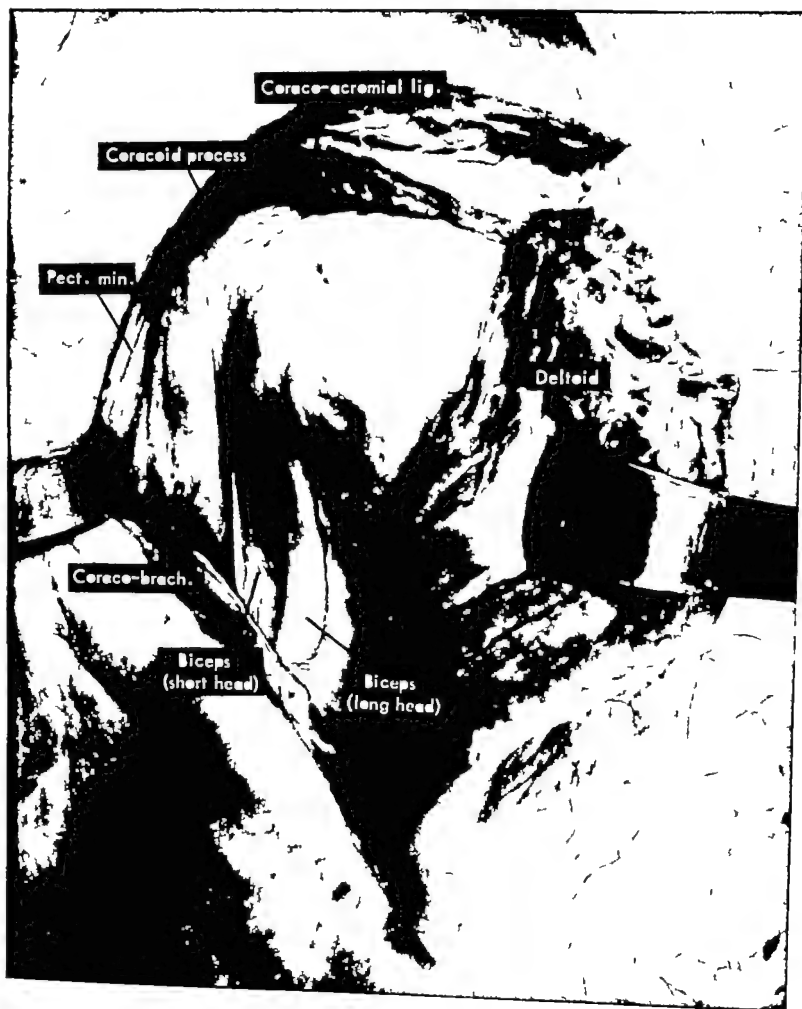
Fig 13—ANTEROPOSTERIOR ROENTGENOGRAM OF
THE LEFT SHOULDER



II—The Cephalic vein is identified, extending along the delto pectoral groove (Fig 14)

ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

III--The Cephalic vein with the Pectoralis major muscle are retracted medially the Deltoid muscle is retracted laterally after cutting across the anterior portion of this muscle near the clavicle. Observe the tendon of the long head of the Biceps (the tendon sheath was removed) and the coracoid process with the insertions of the short head of the Biceps the Coraco-brachialis and the Pectoralis minor muscles. A portion of the coraco-acromial ligament can be seen (Fig. 15)



ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

IV--The tip of the coracoid process has been osteotomized and reflected downwards with the attached short head of the Biceps and Coraco-brachialis muscles. Observe the Musculo-cutaneous nerve entering the Coraco-brachialis muscle. In the depth of the region the Subscapularis muscle is seen passing forward and outward to insert in the lesser tuberosity of the humerus (Fig 16)



ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

V—The Subscapularis muscle has been tenotomized near its insertion into the lesser tuberosity of the humerus separated from the underlying anterior capsule of the shoulder joint and retracted medially (Fig. 17)



ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

VI—The capsule of the shoulder joint has been opened by a vertical incision. The head of the humerus and the anterior border of the glenoid are seen (Fig. 18)



POSTERIOR APPROACH TO THE SHOULDER JOINT REGION



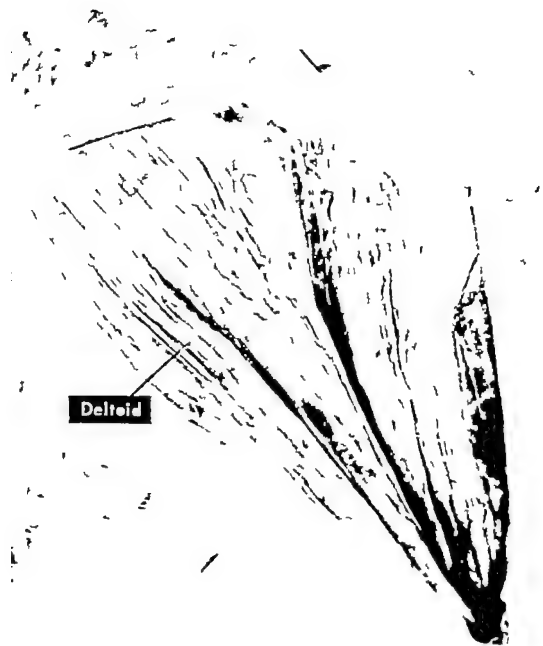
POSTERIOR APPROACH TO THE SHOULDER JOINT REGION

- 1—The skin incision begins at the junction of the middle and inner thirds of the spine of the scapula, and continues outwards about one inch below this spine. The incision then curves downwards over the posterior aspect of the shoulder region for approximately one inch and a half (remember not to damage the Upper lateral cutaneous nerve of the arm sensory branch of the Axillary nerve) (Fig. 19)



Fig. 20—POSTEROANTERIOR ROENTGENOGRAM OF
THE RIGHT SHOULDER

POSTERIOR APPROACH TO THE SHOULDER JOINT REGION

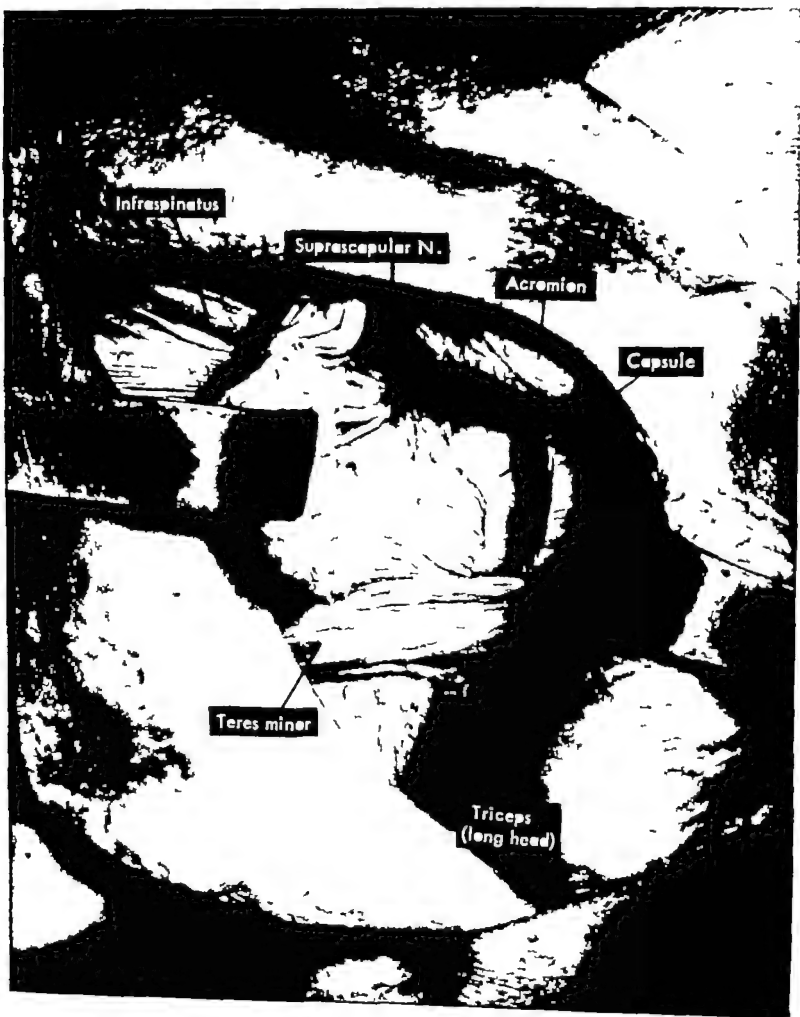




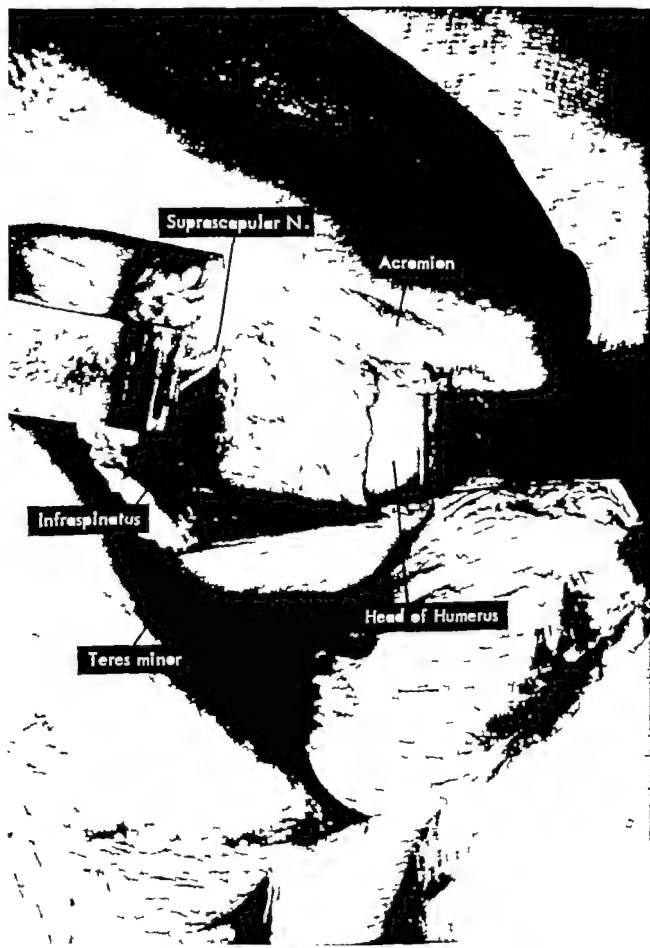
III--The Deltoid has been detached from its insertion on the spine of the scapula and reflected laterally

The Infraspinatus Teres minor and long head of the Triceps are visualized. The long head of the Triceps and the Axillary nerve and vessels

IV—The Infraspinatus muscle has been sectioned and retracted medially. The Suprascapular nerve runs over the lateral border of the spine of the scapula and pierces the deep face of the Infraspinatus muscle. The posterior aspect of the neck of the scapula and the joint capsule can be seen (Fig. 23).



POSTERIOR APPROACH TO THE SHOULDER JOINT REGION



ANATOMY OF THE ARM

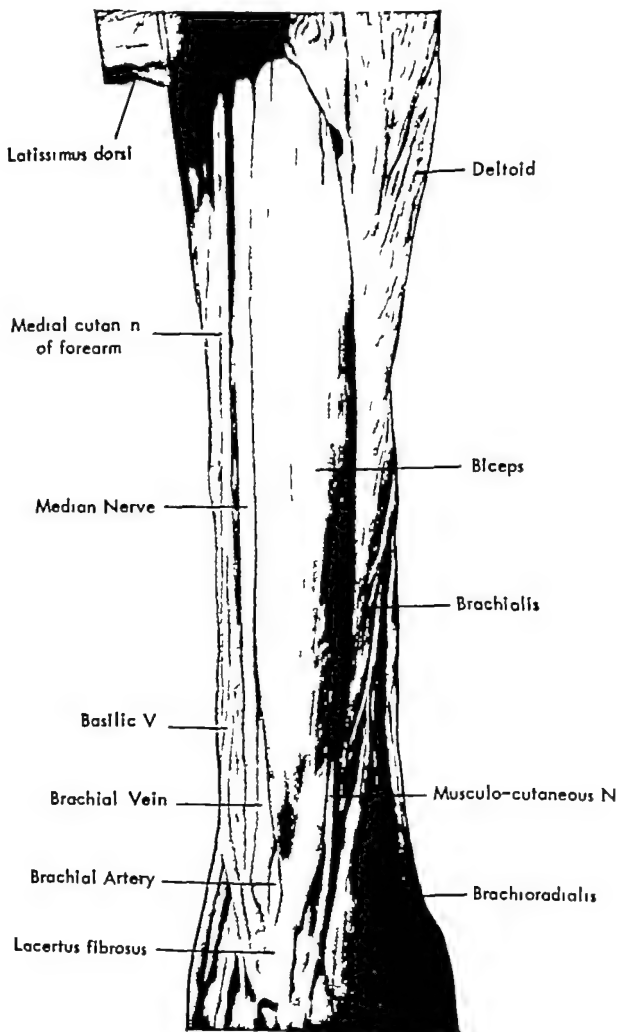
ANTERIOR ASPECT OF THE ARM

Fig. 25—ANTERIOR ASPECT OF THE ARM

The muscle belly of the Biceps is in front of the Brachialis

The Median nerve runs along the medial border of the Biceps

Close to the elbow region the Musculo-cutaneous nerve is at the lateral border of the Biceps and pierces the fascia to become the Lateral cutaneous nerve of the forearm



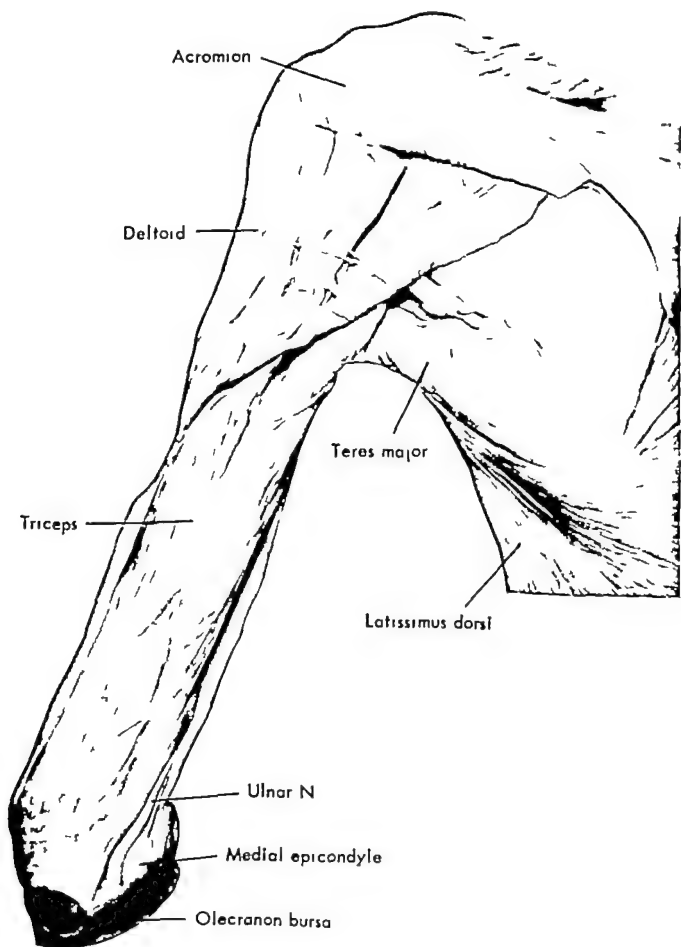
POSTERIOR ASPECT OF THE ARM

Fig 26—POSTERIOR ASPECT OF THE ARM

Observe the long and lateral heads of the Triceps. The deep enveloping fascia merges at the sides with the lateral and medial intermuscular septums which were not removed.

The Ulnar nerve is behind the medial intermuscular septum and medial epicondyle and is in contact with the medial head of the Triceps.

Observe the subcutaneous oleocranon bursa.



POSTERIOR ASPECT OF THE ARM

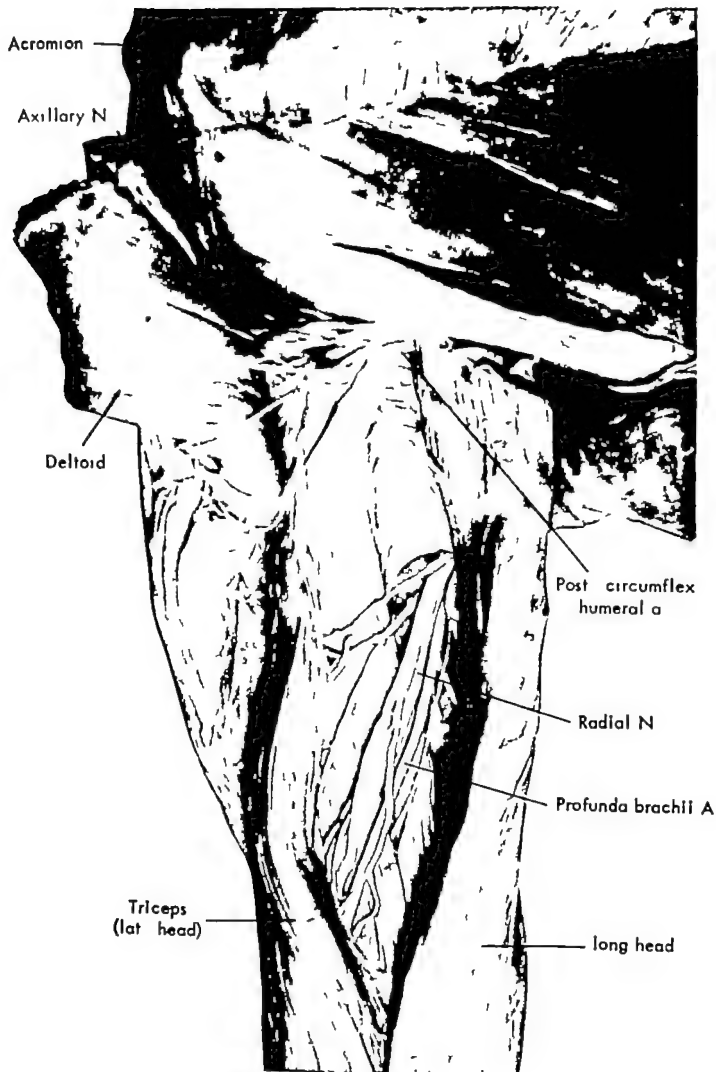
Fig 27—POSTERIOR ASPECT OF THE ARM

The long and lateral heads of the *Triceps* lie together over the medial head

Observe the Radial nerve and the *Profunda brachii* artery

The Radial nerve leaves the spiral groove and pierces the lateral intermuscular septum to penetrate into the anterior compartment of the arm four inches above the lateral epicondyle

The Deltoid muscle was retracted upwards to show the Axillary nerve and the Posterior circumflex humeral artery



LATERAL ASPECT OF THE ARM

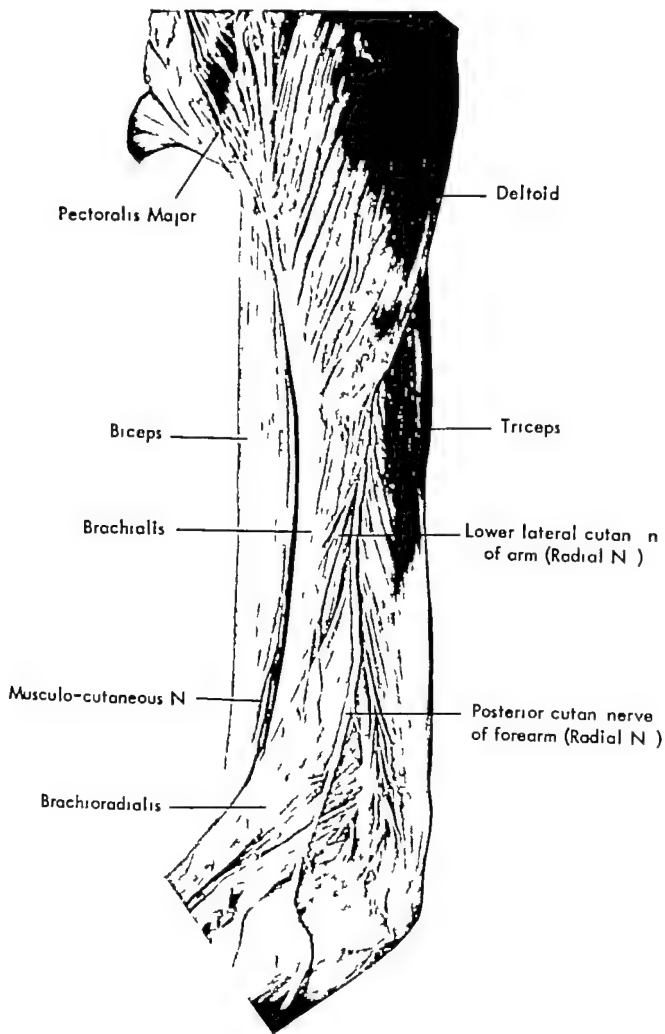
Fig. 28—LATERAL ASPECT OF THE ARM

Observe

a—The muscles of the arm

b—The Lower lateral cutaneous nerve of the arm the Posterior cutaneous nerve of the forearm and the Musculo-cutaneous nerve

c—The lateral intermuscular septum.

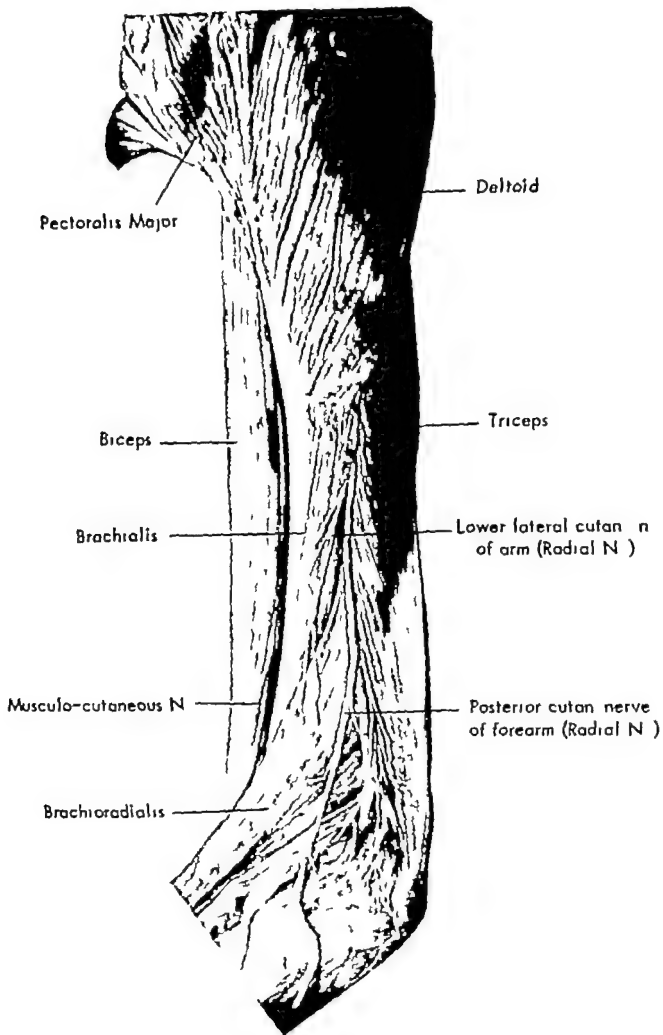


LATERAL ASPECT OF THE ARM

Fig. 28—LATERAL ASPECT OF THE ARM

Observe

- a—The muscles of the arm
- b—The Lower lateral cutaneous nerve of the arm, the Posterior cutaneous nerve of the forearm and the Musculo-cutaneous nerve.
- c—The lateral intermuscular septum

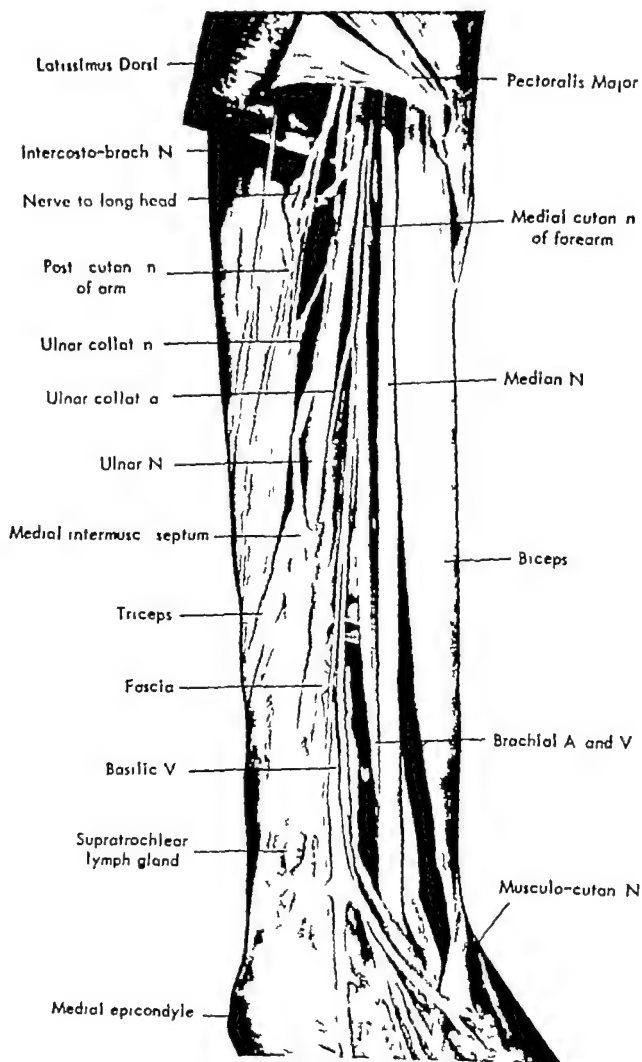


MEDIAL ASPECT OF THE ARM

Fig. 29—MEDIAL ASPECT OF THE ARM

Observe

- a—The Median nerve crosses very obliquely in front of the Brachial artery
- b—The Ulnar nerve is in intimate relationship with the Brachial artery in the upper third of the arm and then crosses behind the medial intermuscular septum accompanied by the Superior ulnar collateral artery and the Ulnar collateral nerve (branch of the Radial nerve to the medial head of the Triceps)
- c—The motor nerves to the long head of the Triceps
- d—The Posterior cutaneous nerve of the arm and the Intercostobrachial nerve.
- e—The Medial cutaneous nerve of the forearm and the Basilic vein.
- f—The supratrochlear Lymph node

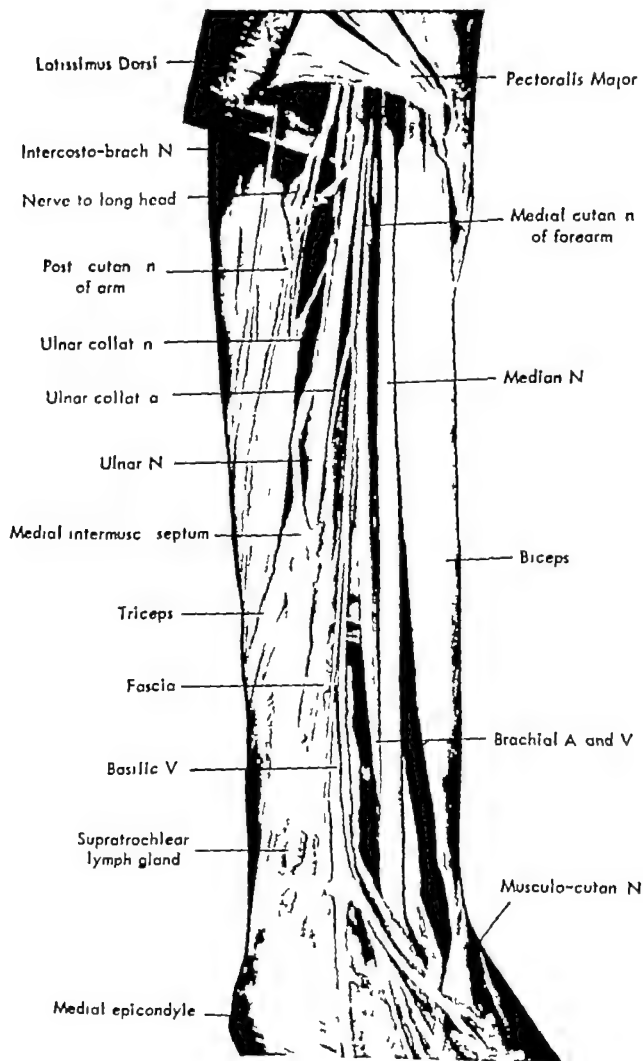


MEDIAL ASPECT OF THE ARM

Fig. 29—MEDIAL ASPECT OF THE ARM

Observe

- a--The Median nerve crosses very obliquely in front of the Brachial artery
- b--The Ulnar nerve is in intimate relationship with the Brachial artery in the upper third of the arm and then crosses behind the medial intermuscular septum accompanied by the Superior ulnar collateral artery and the Ulnar collateral nerve (branch of the Radial nerve to the medial head of the Triceps)
- c--The motor nerves to the long head of the Triceps
- d--The Posterior cutaneous nerve of the arm and the Intercostobrachial nerve
- e--The Medial cutaneous nerve of the forearm and the Basilic vein
- f--The supratrochlear Lymph node

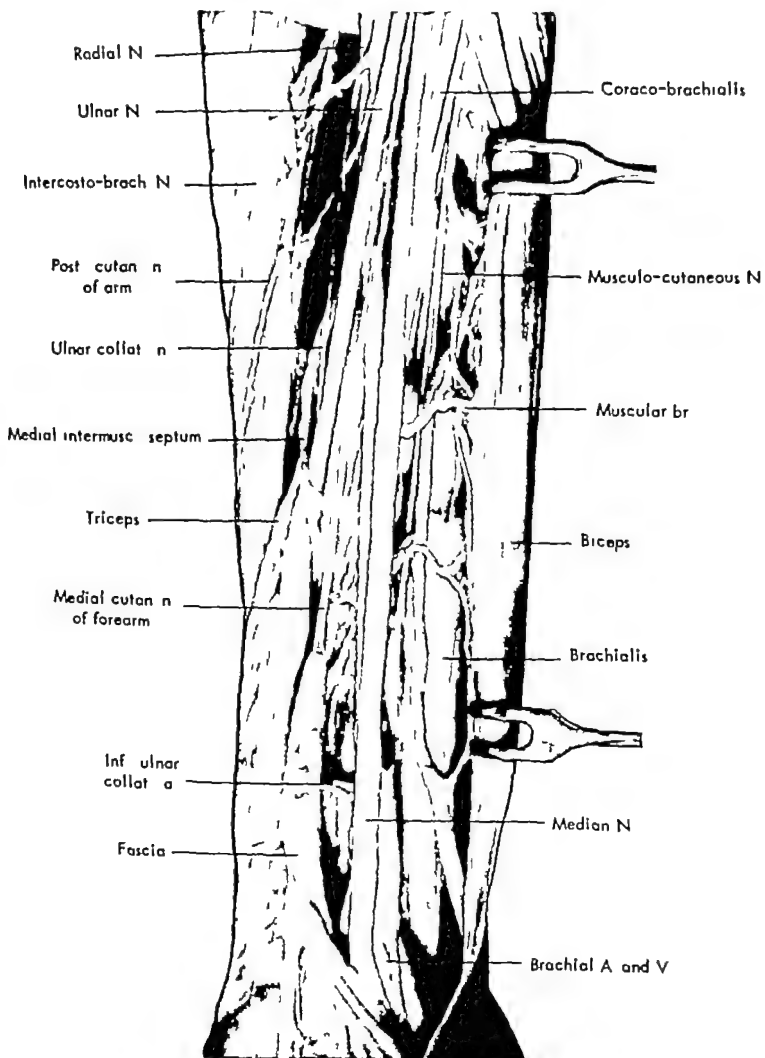


MEDIAL ASPECT OF THE ARM

Fig. 30—MEDIAL ASPECT OF THE ARM

Observe

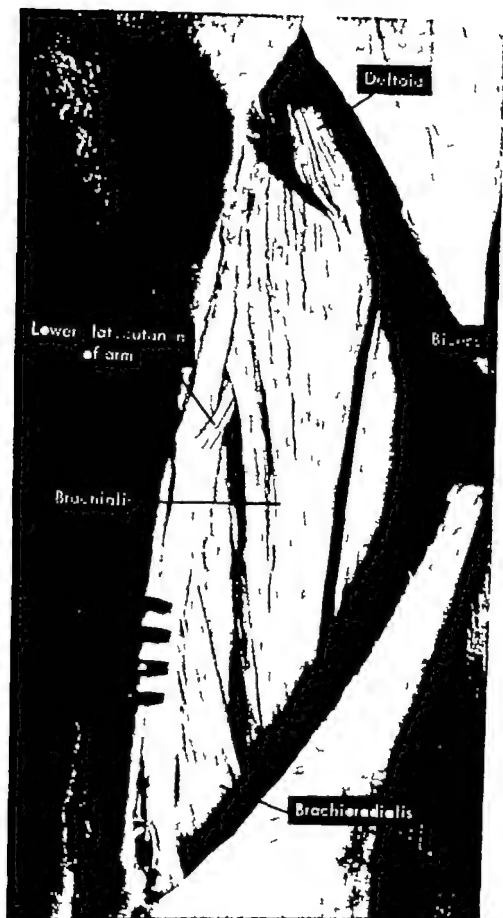
- a--The Musculo-cutaneous nerve runs between the Biceps and Brachialis muscles and innervates both muscles
- b--The Radial nerve is partially shown in the highest part of the arm behind the Brachial artery
- c--The relationship between the Median nerve and Brachial artery
- d--The Inferior ulnar collateral artery and muscular branches from the Brachial artery
- e--The fascia is reflected with the Medial cutaneous nerve of the forearm and the Basilic vein



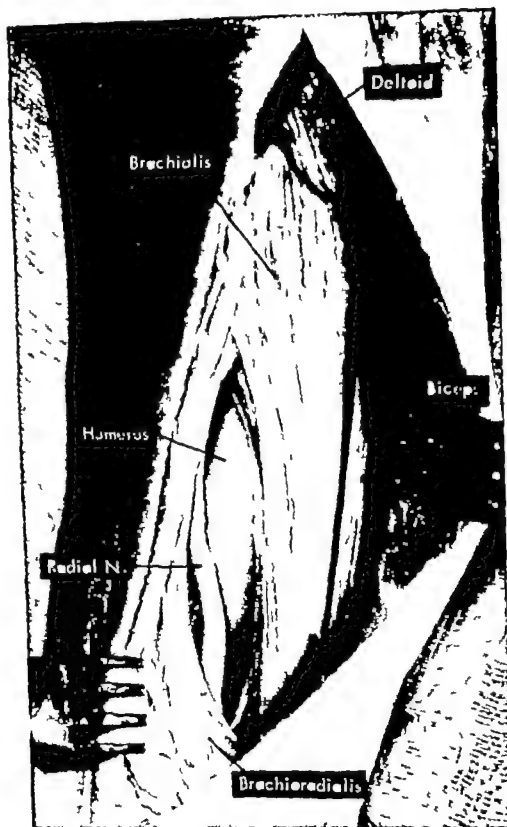


LATERAL APPROACH TO THE MIDDLE THIRD OF THE
HUMERUS

- 1—The skin incision begins at the anterior border of the distal portion of the Deltoid muscle, and extends distally along the lateral aspect of the arm (Fig. 31)



II—The deep fascia is incised longitudinally in front of the lateral intermuscular septum. Observe the Deltoid, the Brachialis, the Brachioradialis, and the Biceps muscles (Fig. 32).



III—The Radial nerve is found running deep in the groove formed between the Brachioradialis and Brachialis muscles and is isolated. Retracting the Brachialis forward and Brachioradialis posteriorly, the periosteum is incised longitudinally to expose the shaft of the humerus. To expose the upper third of the humerus the Brachialis is desinserted and the incision continues along the anterior border of the Deltoid (Fig. 33).

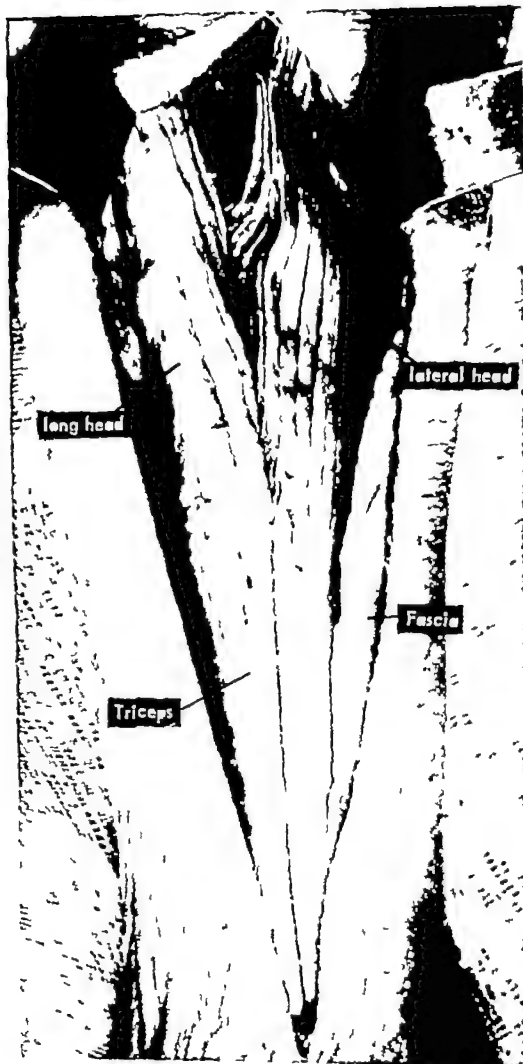
POSTERIOR APPROACH TO THE HUMERUS



POSTERIOR APPROACH TO THE HUMERUS

I—The skin incision runs along the midline of the posterior aspect of the arm it begins one inch below the posterior border of the Deltoid muscle and may be extended distally to the olecranon fossa (Fig. 34)

11—The deep fascia is incised longitudinally and the long and lateral heads of the Triceps muscle are exposed. Observe the gap between these two heads of the Triceps (Fig 35)



III—The gap between the two superficial heads of the Triceps is widely opened by sharp dissection
The medial head of the Triceps the Radial nerve with its branches, and the Profunda brachii artery are now exposed (Fig 38)



Radial N.

Prof. brachii

Triceps
(lat. head)

medial head



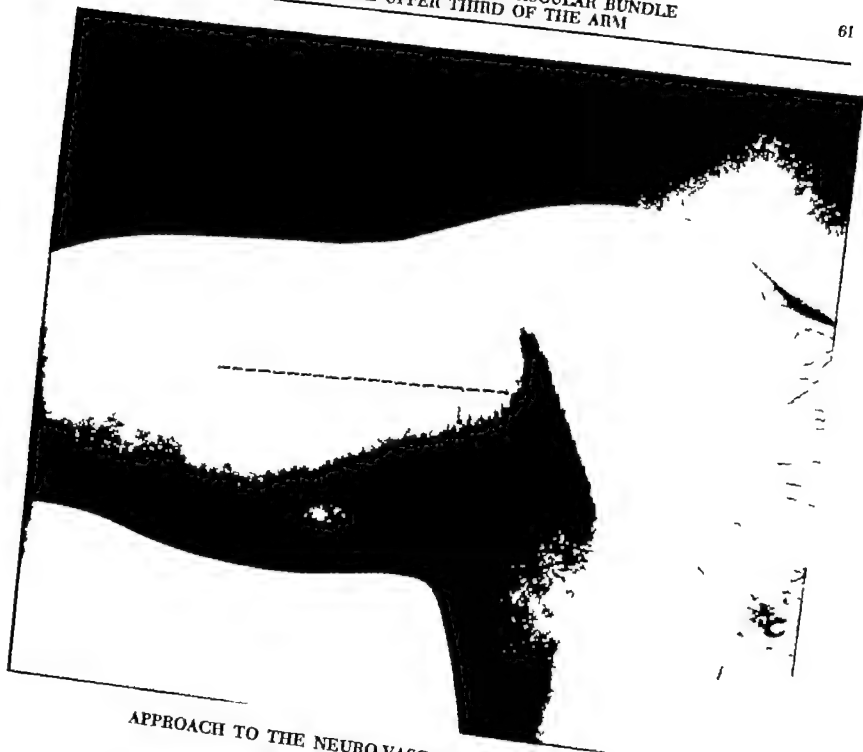
Radial N.

medial head

Triceps
(lat. head)

Humerus

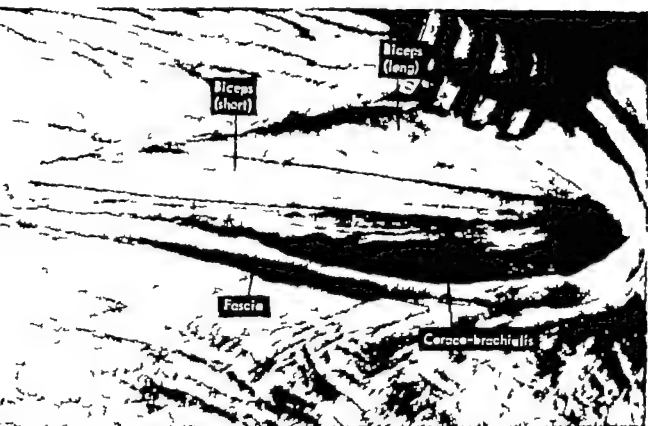
Prof. brachii m.



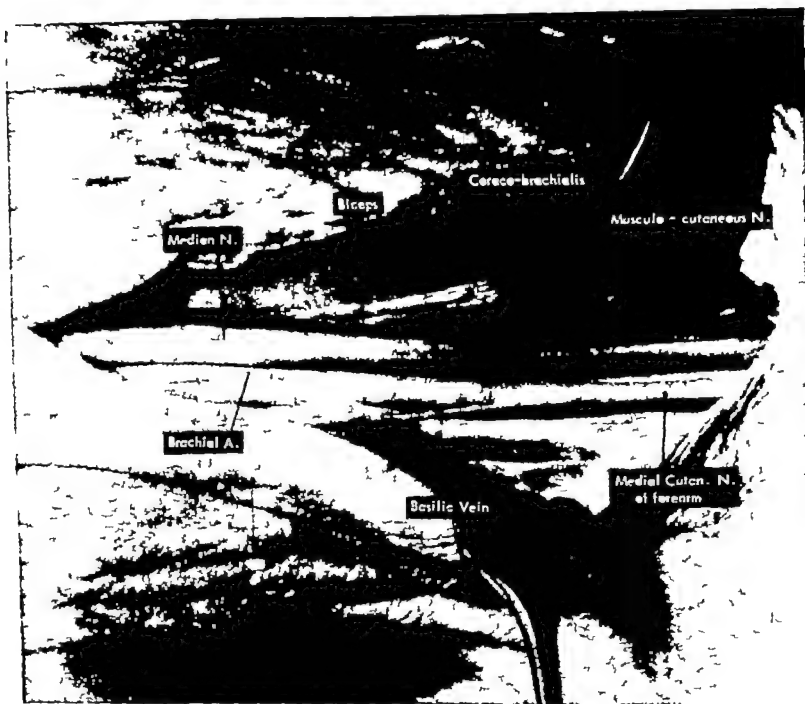
APPROACH TO THE NEURO-VASCULAR BUNDLE AT THE
UPPER THIRD OF THE ARM

I—The arm is placed in abduction with the forearm and hand in supination. The skin incision extends along the medial border of the Coracobrachialis muscle (Fig 38)

APPROACH TO THE NEURO-VASCULAR BUNDLE
AT THE UPPER THIRD OF THE ARM

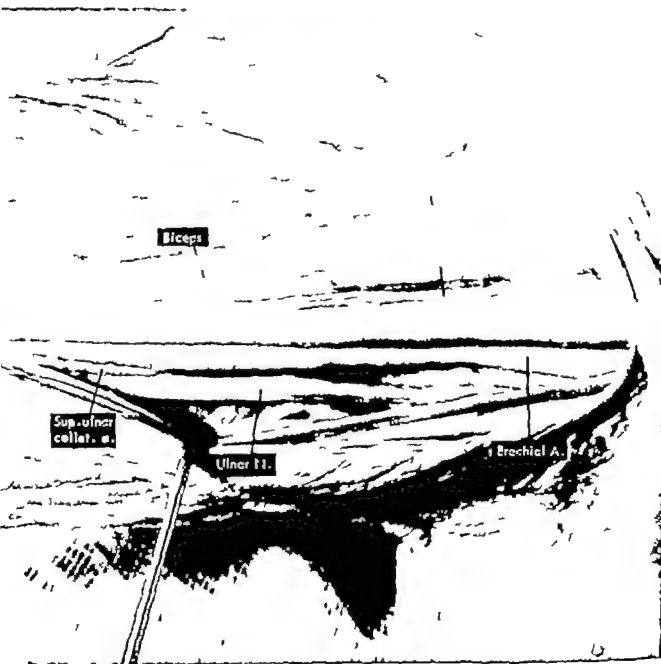


I—The deep fascia is incised longitudinally. The Coraco-brachialis and the short and long heads of the Biceps are seen (Fig. 39)



III—The Coraco-brachialis muscle is retracted. The Musculo-cutaneous nerve is seen entering the medial part of this muscle. Observe the Median nerve running along the Brachial artery deep and anterior to the Medial cutaneous nerve of the forearm and the Basilic vein (Fig 40)

APPROACH TO THE NEURO-VASCULAR BUNDLE
AT THE UPPER THIRD OF THE ARM



IV—The Medial cutaneous nerve of the forearm and the Basilic vein are retracted. The Ulnar nerve lies deep and medial to the Brachial artery. The brachial veins were resected (Fig. 41)

ANATOMY OF THE ELBOW

ANTERIOR ASPECT OF THE ELBOW SUPERFICIAL LAYER

Fig. 42—ANTERIOR ASPECT OF THE ELBOW
SUPERFICIAL LAYER

The Musculo-cutaneous nerve descends between the Biceps and Brachialis and gives motor branches to these muscles. Above the fold of the elbow the nerve perforates the lateral aspect of the fascia and becomes subcutaneous. Here assumes an intimate relation with the Cephalic vein. Branches from the Musculo-cutaneous nerve, now named Lateral cutaneous nerve of the forearm supply the sensory innervation to the anterolateral part of the forearm.

The Medial cutaneous nerve of the forearm perforates the brachial fascia through the same opening as the Basilic vein. This occurs usually at the middle third of the arm. In our specimen the perforation is at the lower third. The nerve divides in several branches which supply the sensory innervation to the neighboring areas of the arm and the antero-medial portion of the forearm.

The Medial cutaneous nerve of the arm furnishes sensory innervation to the medial portion of the arm.

All structures are subcutaneous resting upon the fascia.

Observe the large communicating vein which establishes an anastomosis between the superficial and the deep venous system.

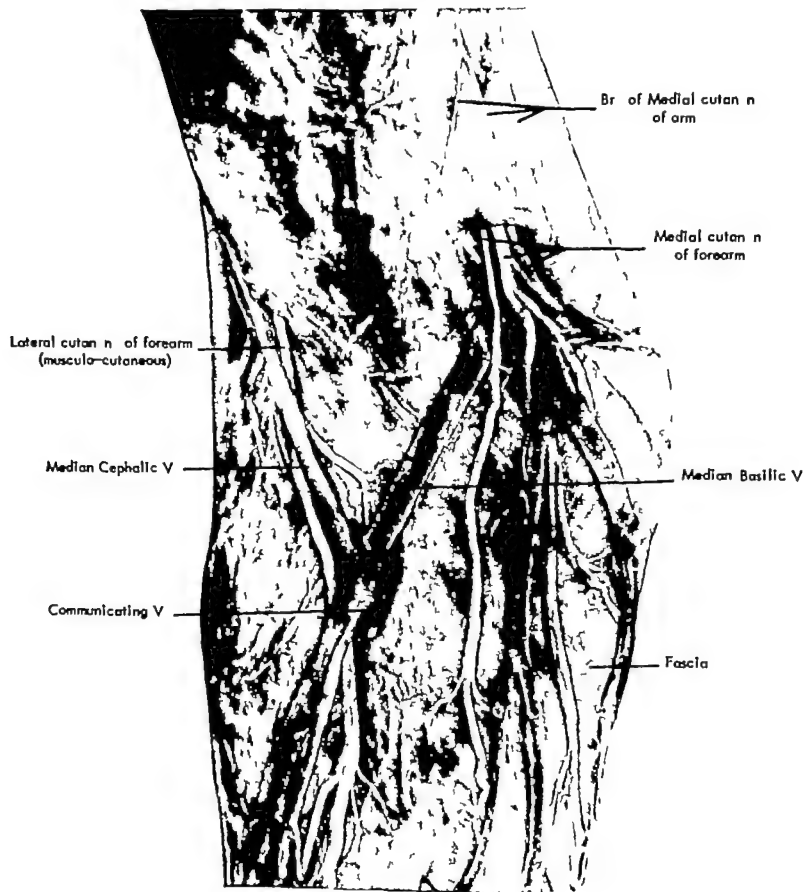


Fig. 43—ANTERIOR ASPECT OF THE ELBOW
DEEP STRUCTURES

The fascia has been removed.

Three muscle groups are encountered the central and proximal group is formed by the Biceps and the Brachialis underneath. From the tendon of the Biceps springs the bicipital aponeurosis or lacertus fibrosus. The lateral muscle group is formed by the Brachioradialis the Extensor carpi radialis longus and the Extensor carpi radialis brevis. The medial muscle group is formed by the Pronator teres the Flexor carpi radialis the Palmaris longus and the Flexor carpi ulnaris.

The Brachial artery and veins and the Median nerve lay between the central and the medial muscle groups.

The Radial recurrent artery and the Radial nerve are found deep in the groove between the central and the lateral muscle groups. At the level of the elbow joint the Radial nerve divides into two terminal branches a superficial sensory branch and a deep motor branch (Posterior interosseous nerve). The former descends the forearm accompanying the Radial artery the latter dives into the Supinator brevis to reach the posterior aspect of the forearm.

Observe the Musculo-cutaneous nerve.

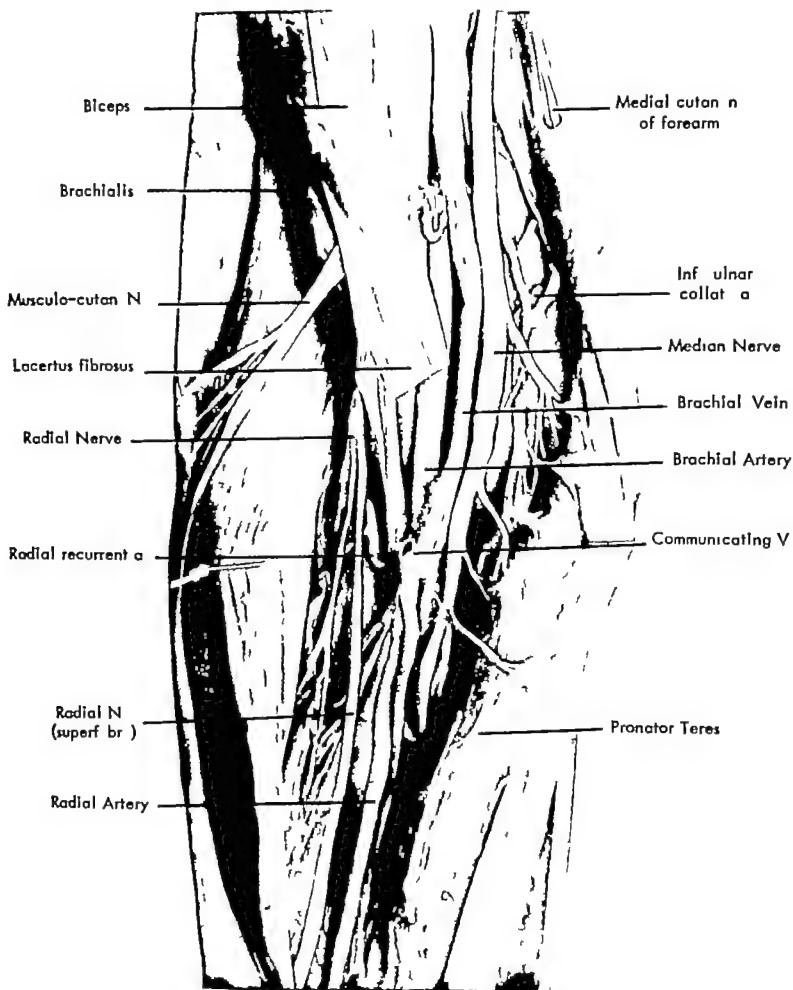


Fig. 44—ANTEROLATERAL VIEW OF THE SAME SPECIMEN
AS IN FIGURE 43

The Radial recurrent artery and the Radial nerve and its branches are seen deep in the groove between the central and lateral muscle groups

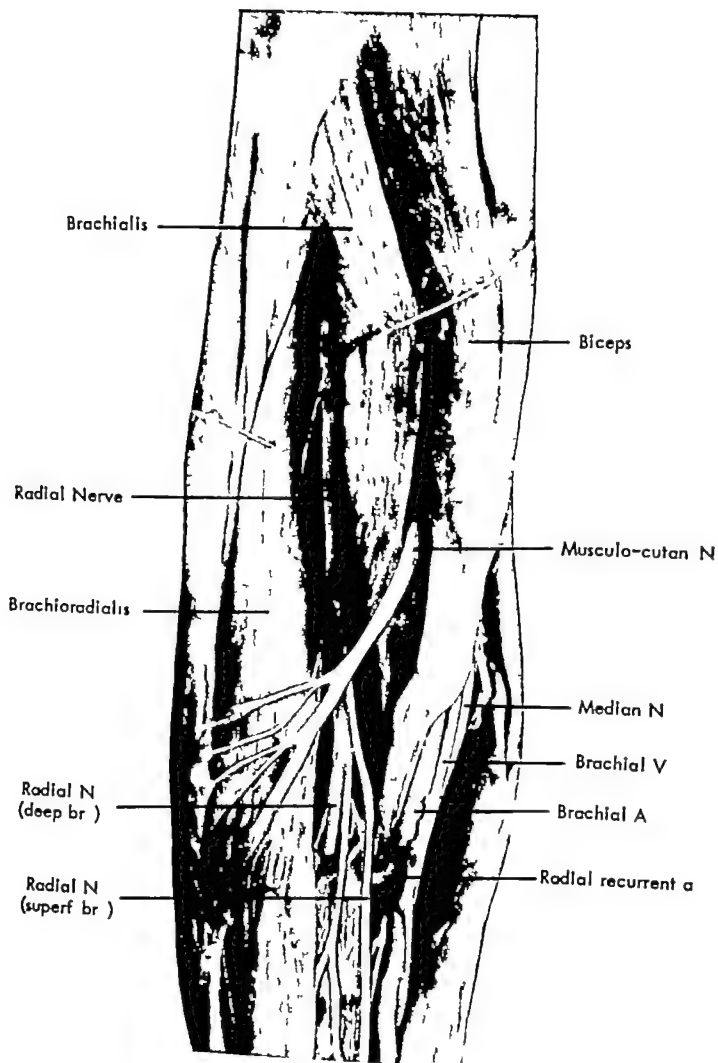
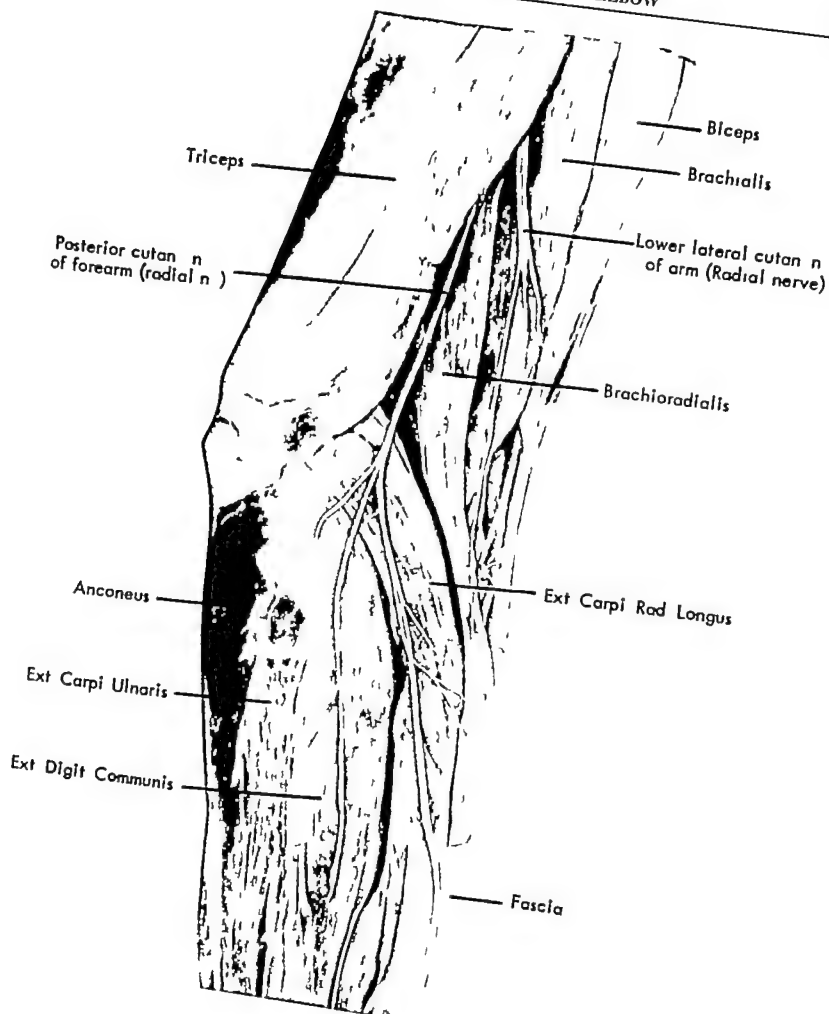


Fig 45—POSTEROLATERAL ASPECT OF THE ELBOW

The subcutaneous nerves which supply sensation to this region are branches of the Radial nerve. These are the Lower lateral cutaneous nerve of the arm and the Posterior cutaneous nerve of the forearm.

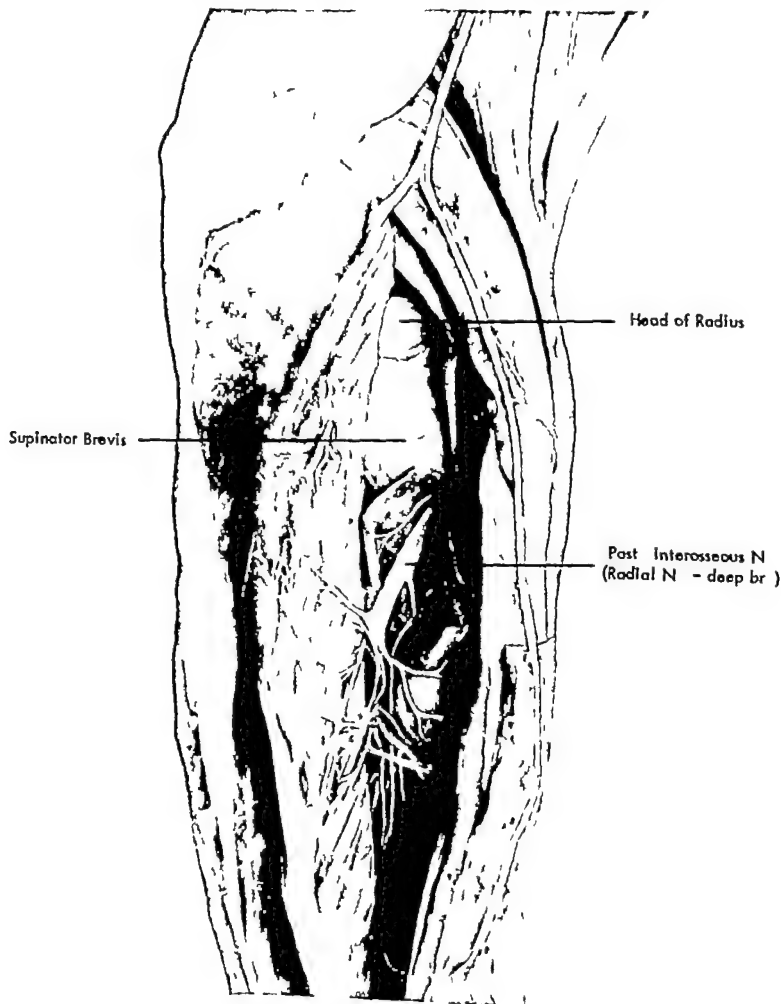


POSTEROLATERAL ASPECT OF THE ELBOW

Fig. 46

The muscle belly of the Extensor digitorum communis has been separated from the Extensor carpi radialis longus and brevis muscles.

The deep plane of the Supinator brevis covers the posterolateral aspect of the elbow joint. The deep branch of the Radial nerve (Posterior interosseous nerve) passes from the anterolateral aspect of the elbow to the posterior aspect of the forearm between the two planes of muscle fibers of the Supinator brevis. This nerve gives muscular branches to the dorsal muscles of the forearm and terminal articular branches to the radio-carpal and intercarpal joints. (See Figs 77 and 97 pages 115 and 146.)



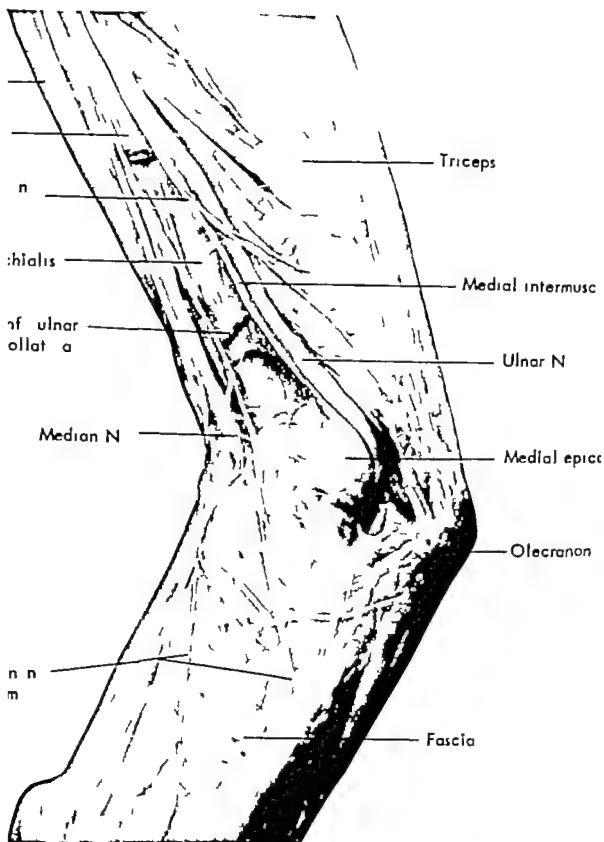


Fig. 47—MEDIAL ASPECT OF THE ELBOW

The Ulnar nerve descends behind the medial intermuscular septum and in front of the medial head of the Triceps and at the elbow the nerve lies between the medial epicondyle of the humerus and the olecranon. The Ulnar nerve enters the forearm between the humeral and ulnar heads of the Flexor carpi ulnaris muscle.

APPROACHES TO THE ELBOW JOINT REGION

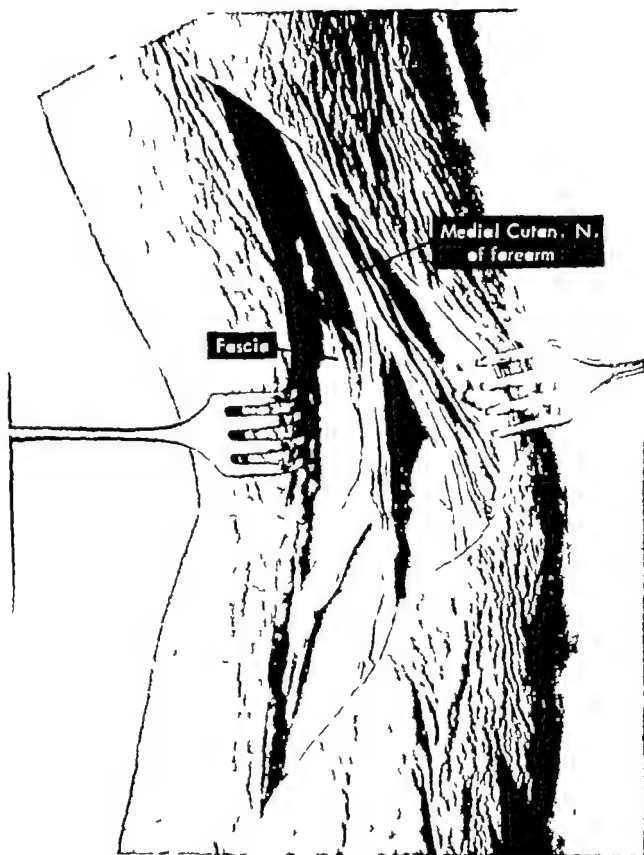


THE ELBOW JOINT REGION—ANTEROMEDIAL APPROACH

- 1—The skin incision begins medial to the Biceps crosses obliquely the flexion crease of the elbow and extends distally over the forearm (Fig 48)

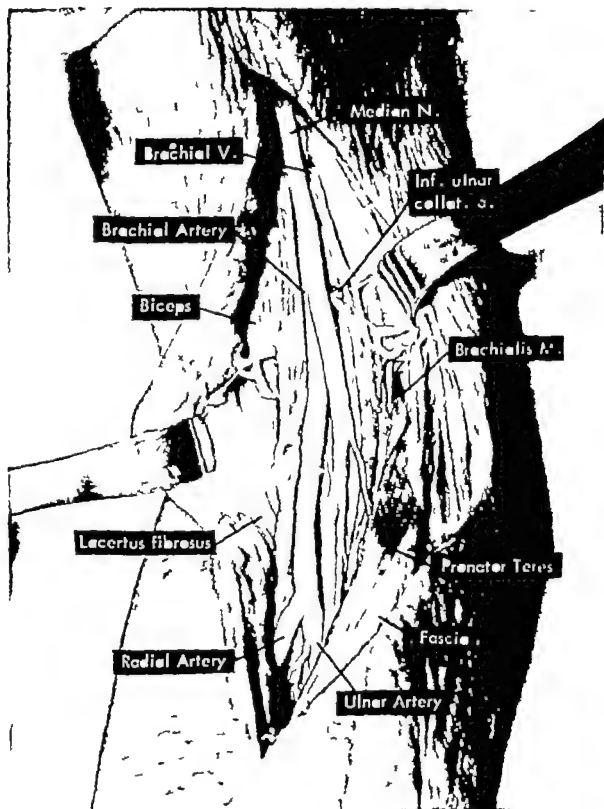


Fig 49—ANTEROPOSTERIOR ROENTGENOGRAM OF
THE RIGHT ELBOW

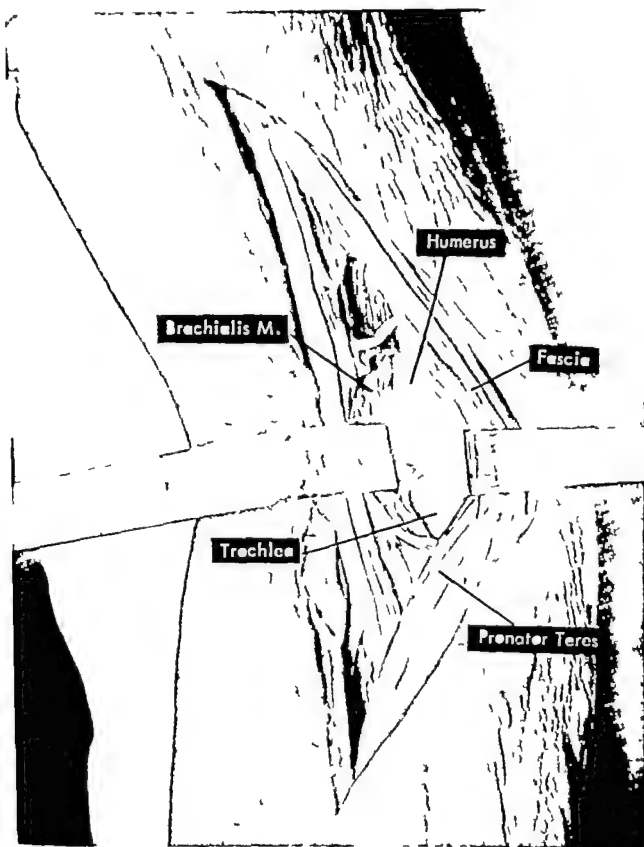


II—The Medial cutaneous nerve of the forearm is found in the subcutaneous tissue in intimate relationship with the Basilic vein (Fig. 50)

THE ELBOW JOINT REGION—ANTEROMEDIAL APPROACH



III—The fascia is incised longitudinally. Observe the relationship between the Brachial artery and veins and the median nerve (Fig. 51)



- IV—The Brachialis muscle is retracted laterally with the Median nerve and the Brachial artery and veins
The Pronator teres is retracted medially
The lower and medial portion of the humerus is exposed
The capsule of the elbow joint is opened and the trochlea can be seen (Fig 52)

THE ELBOW JOINT REGION—ANTEROLATERAL APPROACH



THE ELBOW JOINT REGION—ANTEROLATERAL APPROACH

- 1—The arm will be extended and the forearm supinated. The incision is made along the distal portion of the lateral bicipital groove and extends downwards along the anterior border of the Brachioradialis muscle. At the level of the elbow the incision curves laterally avoiding to cut across the flexion crease (Fig. 53)

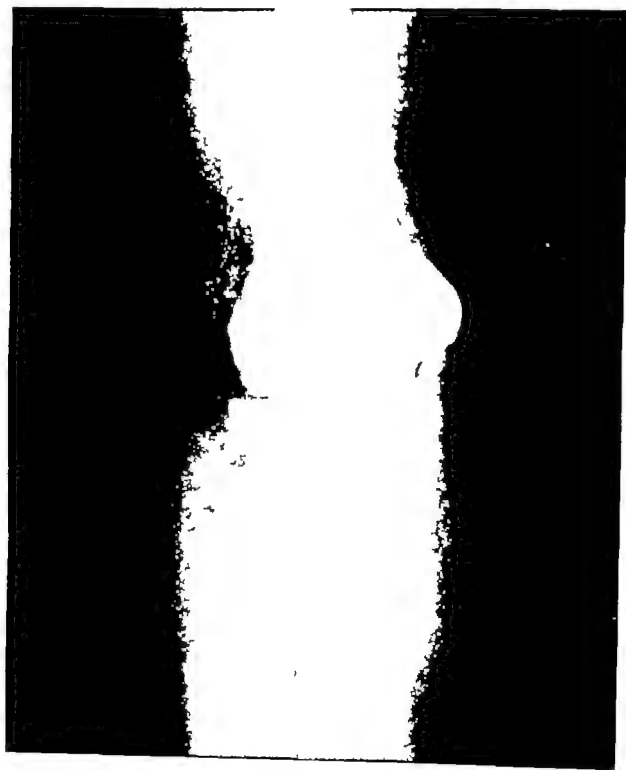
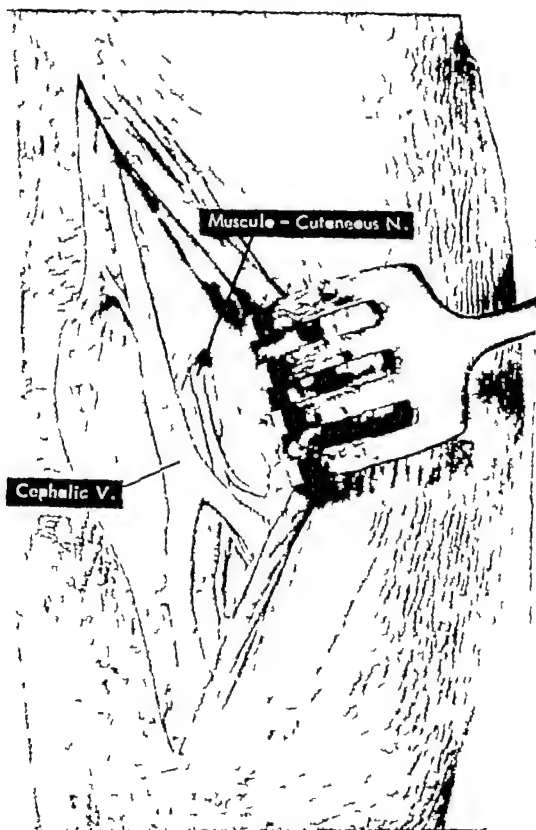


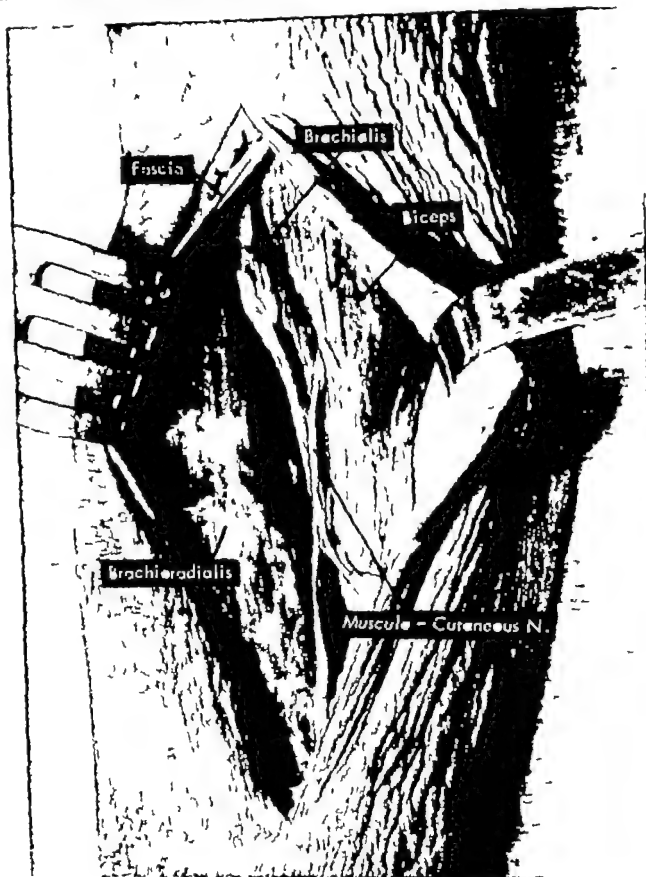
Fig 54—ANTEROPOSTERIOR ROENTGENOGRAM OF
THE RIGHT ELBOW

THE ELBOW JOINT REGION—ANTEROLATERAL APPROACH

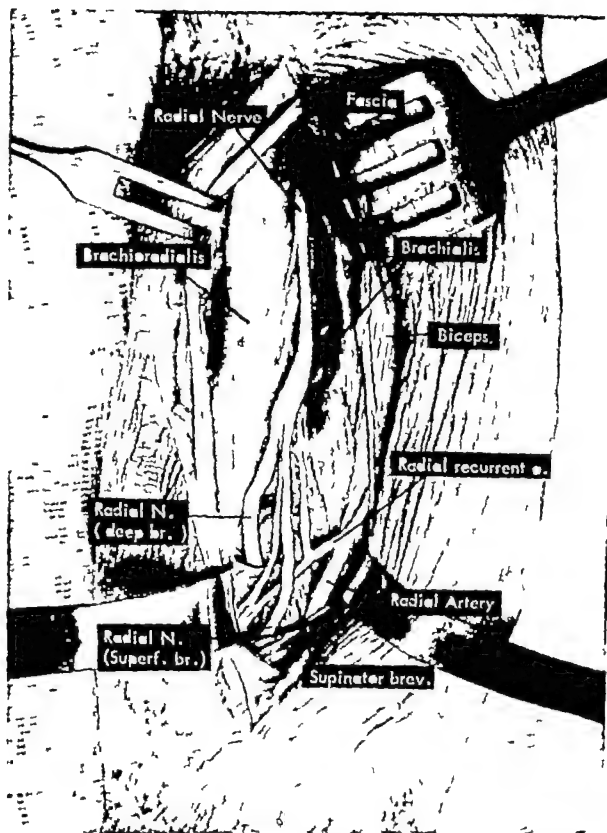


I—The Cephalic vein is found in the subcutaneous fat. After piercing the fascia the Musculo-cutaneous nerve is in close relationship with this vein (Fig 55)

THE ELBOW JOINT REGION—ANTEROLATERAL APPROACH



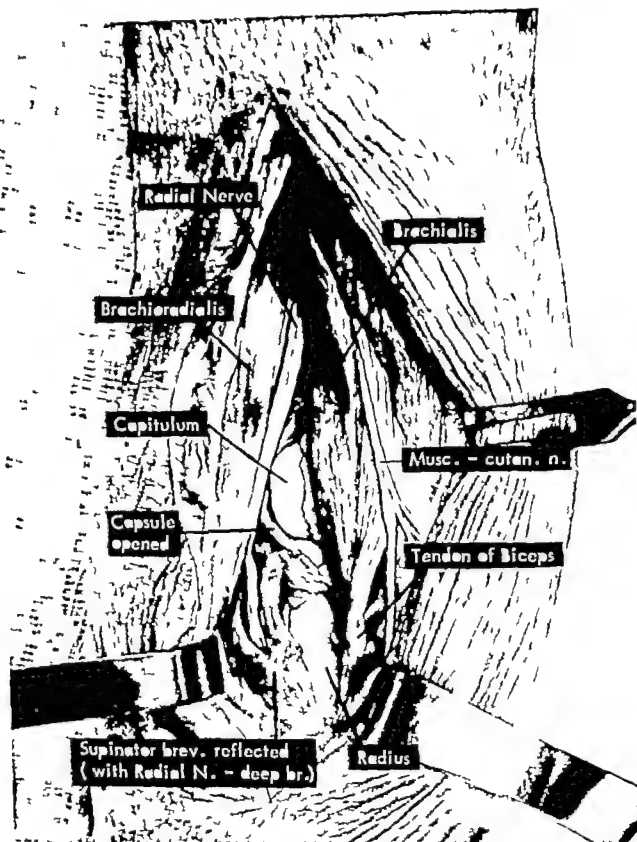
III—The fascia has been incised. The cleavage plane between the Brachioradialis and the Biceps and Brachialis muscles can be seen (Fig 56)



VI—The Radial nerve and Radial recurrent artery are found by retracting the Brachioradialis muscle laterally and the Biceps and Brachialis medially.

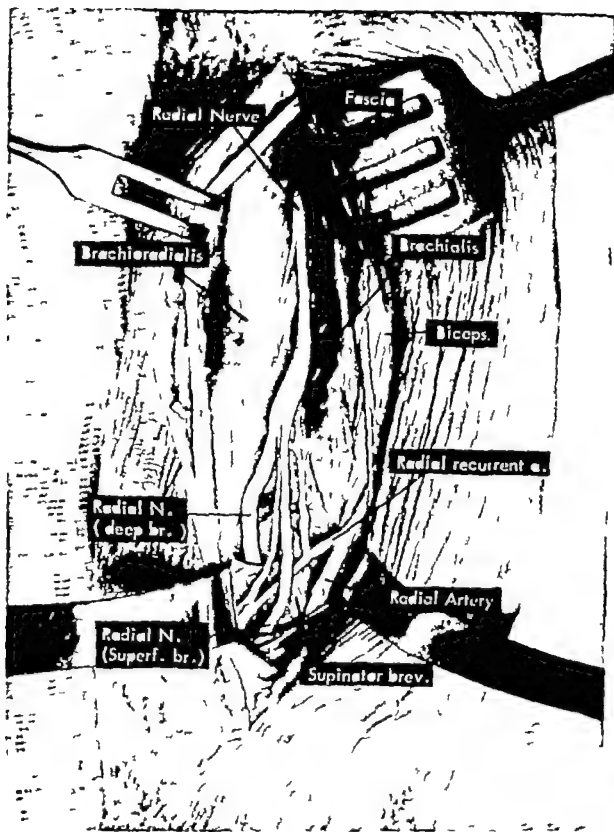
Observe the deep branch of the Radial nerve entering the Supinator brevis muscle after supplying the Brachioradialis and giving a long branch to the Extensor carpi radialis longus.

The superficial branch of the Radial nerve runs along the forearm with the Radial artery (Fig. 57)



V—The Radial recurrent artery has been ligated. After subperiosteal dissection the Supinator brevis muscle with the deep branch of the Radial nerve has been retracted laterally exposing the upper third of the radius

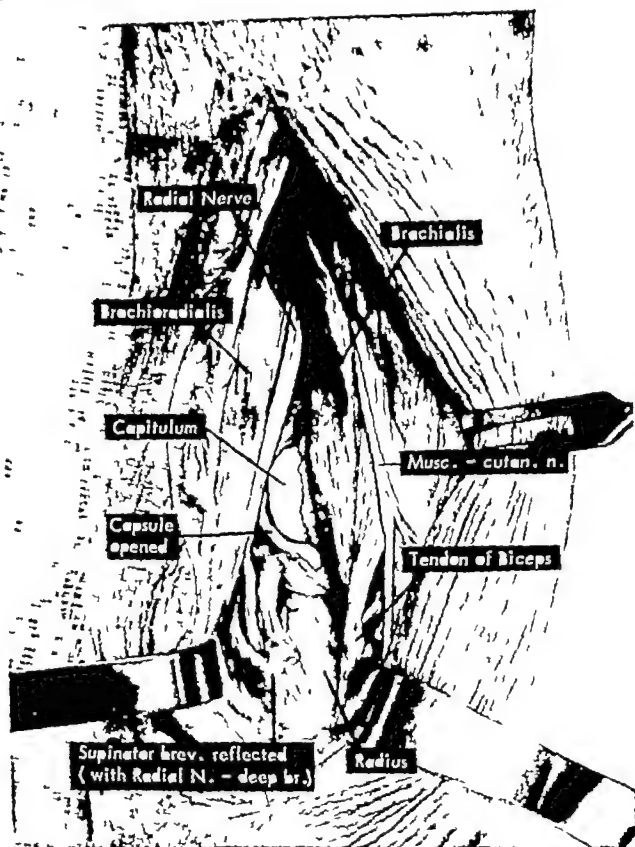
The anterolateral aspect of the joint capsule has been cut longitudinally and the capitulum and the head of the radius are visible (Fig 58)



VI—The Radial nerve and Radial recurrent artery are found by retracting the Brachioradialis muscle laterally and the Biceps and Brachialis medially

Observe the deep branch of the Radial nerve entering the Supinator brevis muscle after supplying the Brachioradialis and giving a long branch to the Extensor carpi radialis longus

The superficial branch of the Radial nerve runs along the forearm with the Radial artery (Fig. 57)



V.—The Radial recurrent artery has been ligated. After subperiosteal dissection the Supinator brevis muscle with the deep branch of the Radial nerve has been retracted laterally exposing the upper third of the radius.

The anterolateral aspect of the joint capsule has been cut longitudinally and the capitulum and the head of the radius are visible (Fig. 58).

THE ELBOW JOINT REGION—LATERAL APPROACH



THE ELBOW JOINT REGION—LATERAL APPROACH

- 1—The lateral epicondyle and the olecranon are the important landmarks. The skin incision begins over the lateral supracondylar ridge of the distal third of the humerus extends downwards behind the lateral epicondyle over the head of the radius and along the cleavage between the Anconeus and Common extensor tendon (Fig 59)

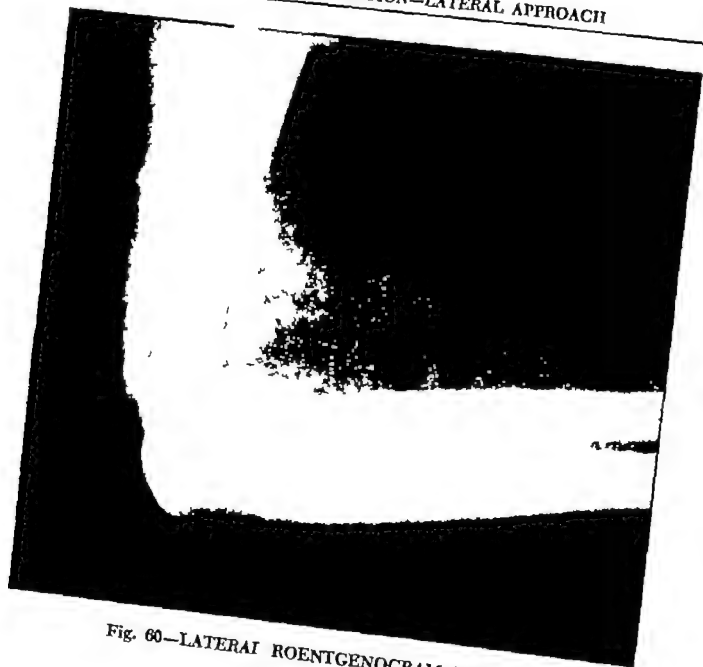
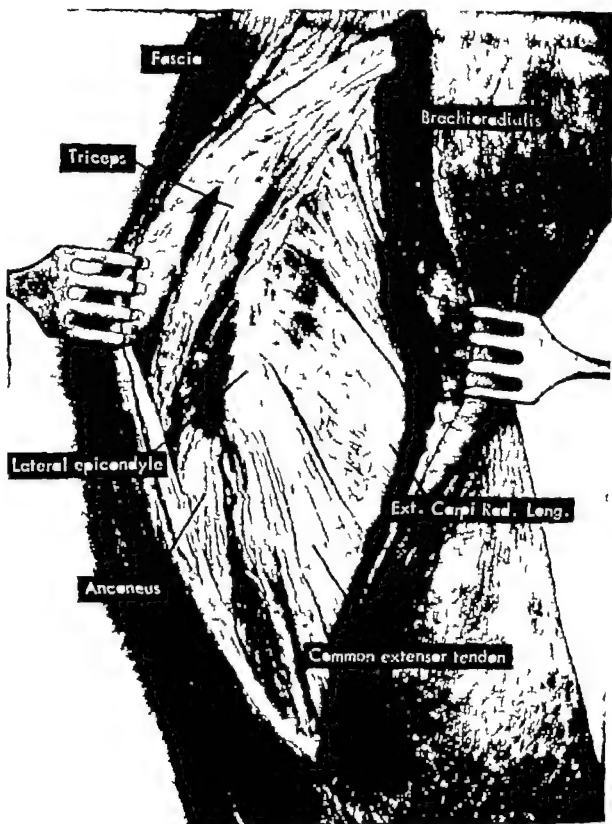
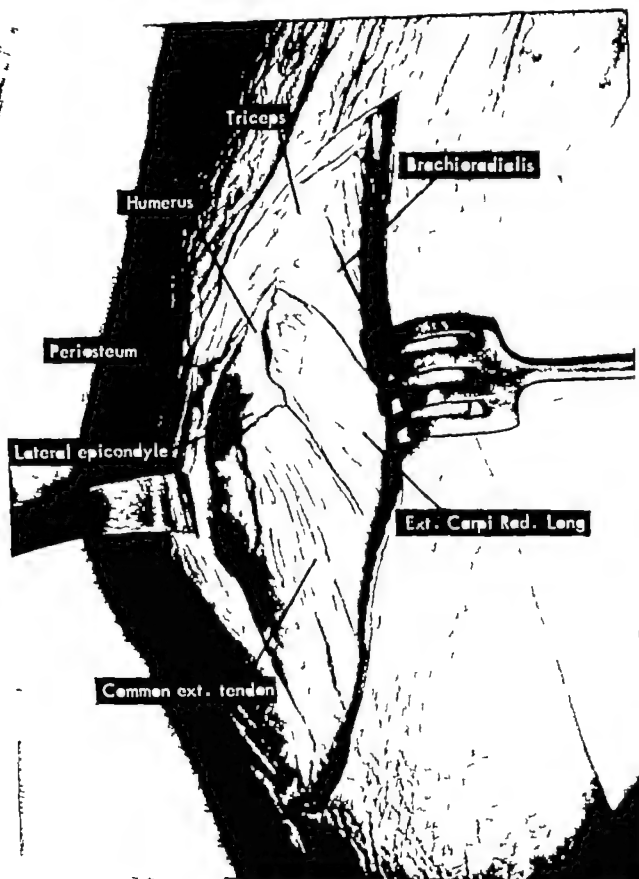


Fig. 60—LATERAL ROENTGENOGRAM OF THE
RIGHT ELBOW

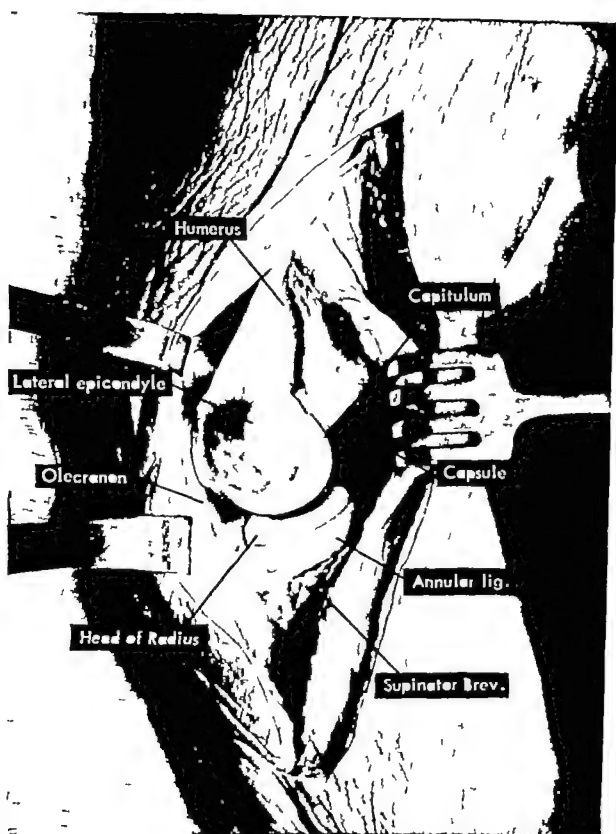
THE ELBOW JOINT REGION—LATERAL APPROACH



II—The skin and fascia have been incised and widely retracted to show the muscles of the posterolateral aspect of the elbow joint (Fig 61)



III—The periosteum has been incised along the lateral supracondylar ridge. The Brachioradialis, the Extensor carpi radialis longus, and the Common extensor tendon have been partially disinserted. The Anconeus has been disinserted from the lateral epicondyle and retracted (Fig 62).



IV—After subperiosteal dissection the muscles and periosteum were retracted from the lower end of the humerus. The insertions of the capsule and lateral ligaments of the elbow joint were detached and retracted forward. A wide exposure of the lower end of the humerus and of the elbow joint was obtained.

Obviously, a small segment of this incision will be sufficient if only the head of the radius and the capitulum are to be exposed (Fig. 63)



THE ELBOW JOINT REGION—MEDIAL APPROACH

I—A slightly curved skin incision which passes between the medial epicondyle and the olecranon (Fig 64)

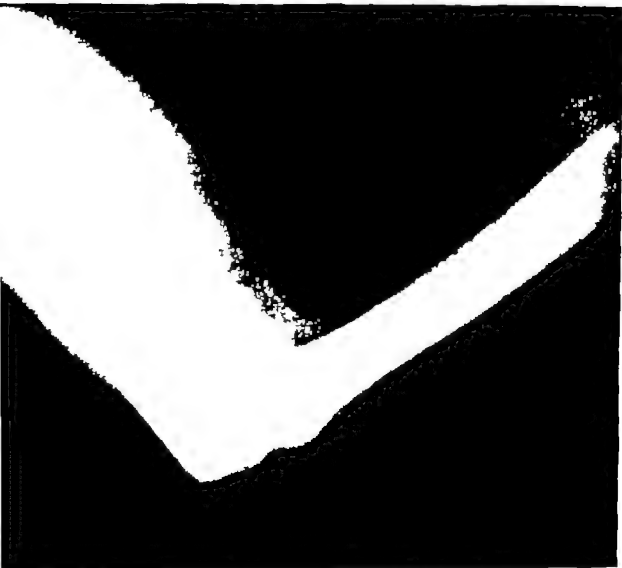
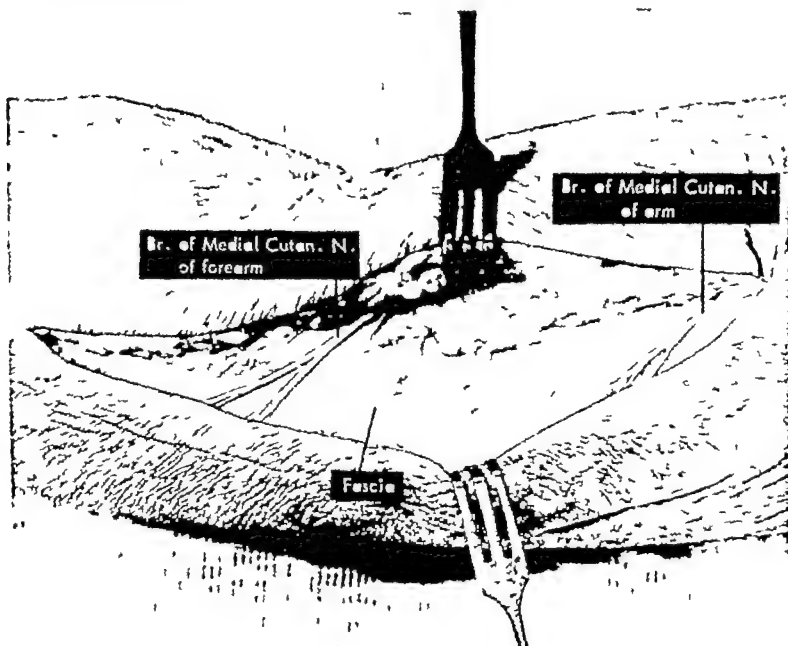
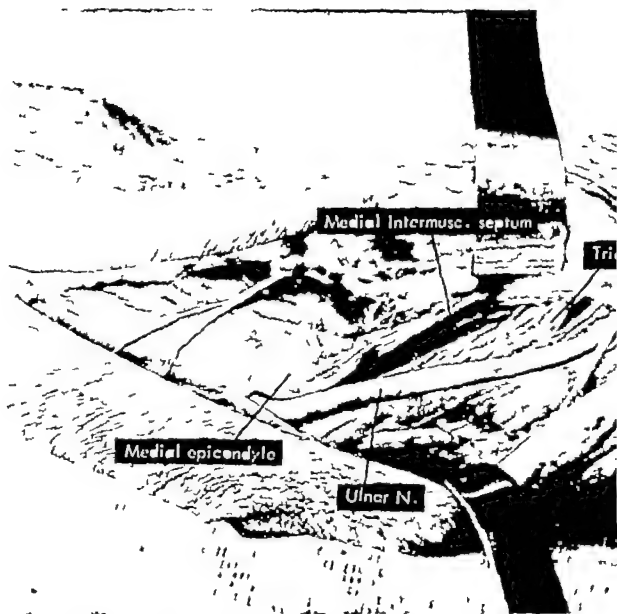


Fig. 65—MEDIAL ROENTGENOGRAM OF THE
RIGHT ELBOW



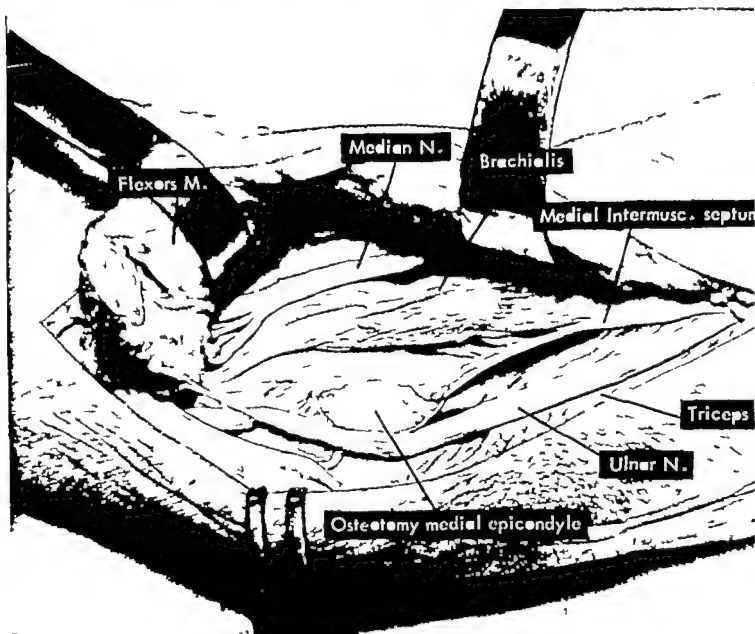
II—Branches of the Medial cutaneous nerve of the forearm and of the Medial cutaneous nerve of the arm are found in the subcutaneous fat (Fig 66)

THE ELBOW JOINT REGION—MEDIAL APPROACH



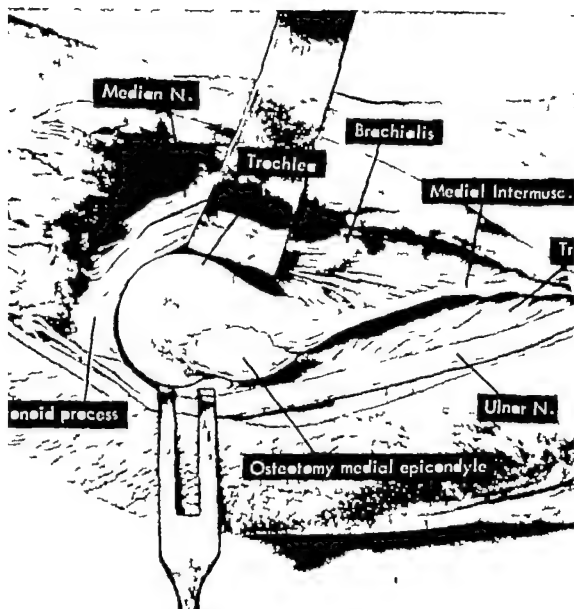
III—The fascia is incised longitudinally and the Ulnar nerve is found descending between the medial head of the Triceps and the medial intermuscular septum. This nerve is isolated (Fig 67)

THE ELBOW JOINT REGION—MEDIAL APPROACH



IV—The medial epicondyle is osteotomized and reflected downwards and forwards with its attached muscles

THE ELBOW JOINT REGION—MEDIAL APPROACH



When the capsule is opened the trochlea and the coronoid process are seen. The Brachialis and the capsule can be reflected subperiosteally for a wider exposure (Fig 69)



THE ELBOW JOINT REGION—POSTERIOR APPROACH

1—The important landmarks are the tip of the olecranon and the medial and lateral epicondyles

A slightly curved skin incision is made over the posterior and distal third of the arm extending down to the lateral aspect of the olecranon (Fig 70)

THE ELBOW JOINT REGION—POSTERIOR APPROACH

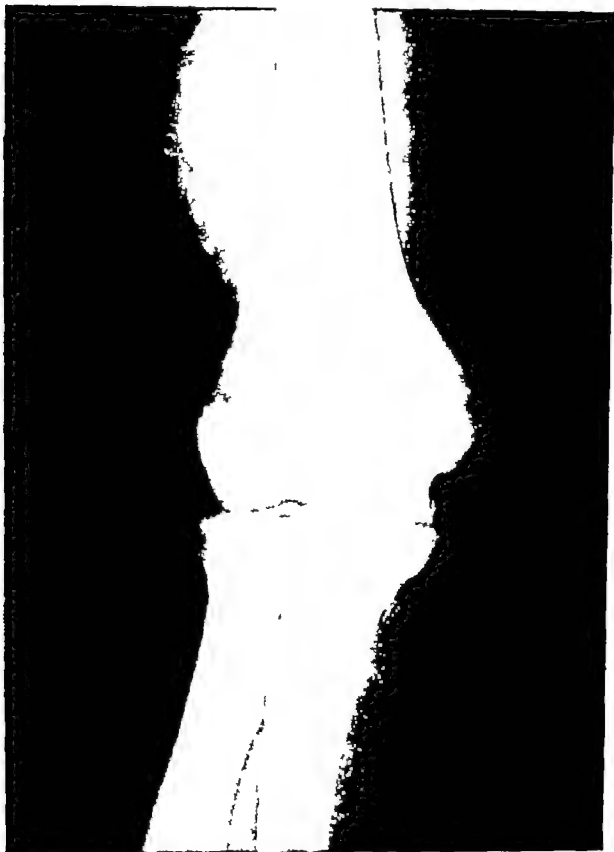
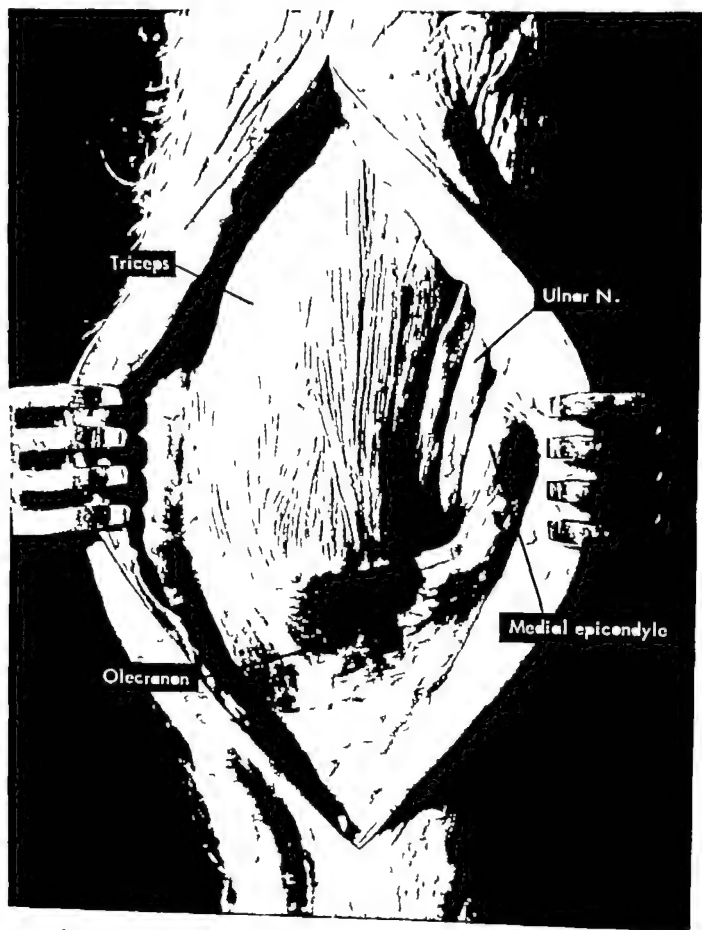


Fig. 71—POSTEROANTERIOR ROENTGENOGRAM OF
THE LEFT ELBOW

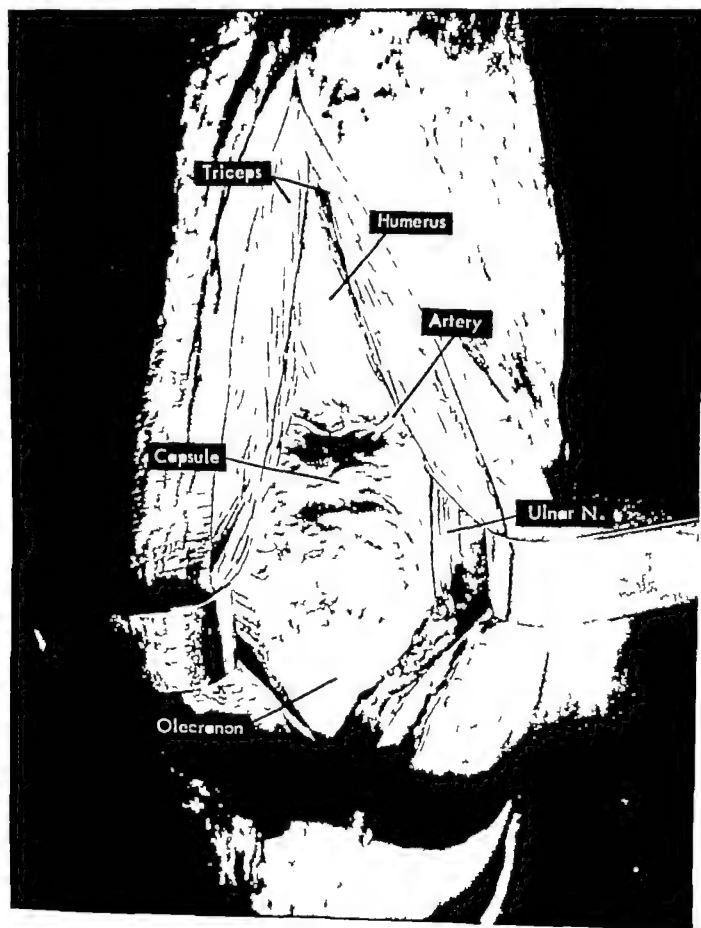


II—The Triceps tendon and the olecranon are exposed. Observe the Ulnar nerve (Fig 72)

THE ELBOW JOINT REGION—POSTERIOR APPROACH

III—The Triceps tendon has been incised in the midline. half is retracted medially and the other half laterally. The lower posterior aspect of the humerus and the capsule of the elbow joint are exposed. The posterior aspect of the elbow joint can be more completely exposed by removing the Flexor carpi ulnaris medially and the Anconeus laterally from their insertions in the olecranon and dorsal border of the ulna.

Observe the Ulnar nerve and branches of the periarthicular arterial circle around the elbow joint (Fig. 73).

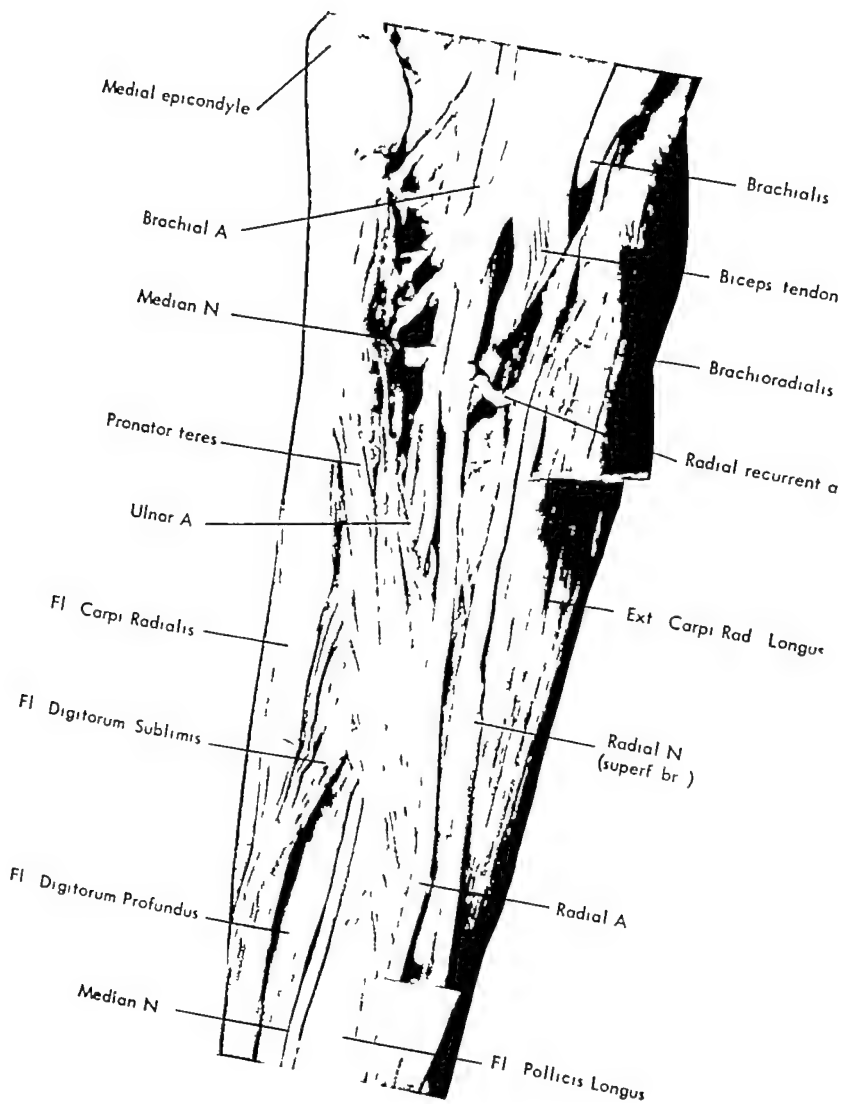


ANATOMY OF THE FOREARM

Fig 74—ANTERIOR ASPECT OF THE FOREARM (Left)

Observe

- a—The Brachial artery lies between the Median nerve and the tendon of the Biceps. Both artery and nerve are behind the bicipital aponeurosis (lacertus fibrosus).
- b—The Median nerve pierces between the two heads of the Pronator teres muscle and is found in the middle portion of the forearm between the superficial and deep muscles in the interval formed by the Flexor pollicis longus and Flexor digitorum profundus.
- c—In the upper third of the forearm the Median nerve is separated from the Ulnar artery by the ulnar head of the Pronator teres muscle.
- d—The motor branches leave the Median nerve from its medial side.
- e—The superficial branch of the Radial nerve accompanies the Radial artery in the middle third of the forearm and then passes backwards underneath the tendon of the Brachioradialis. On the lateral surface of the distal third of the forearm the nerve perforates the deep fascia and becomes subcutaneous.



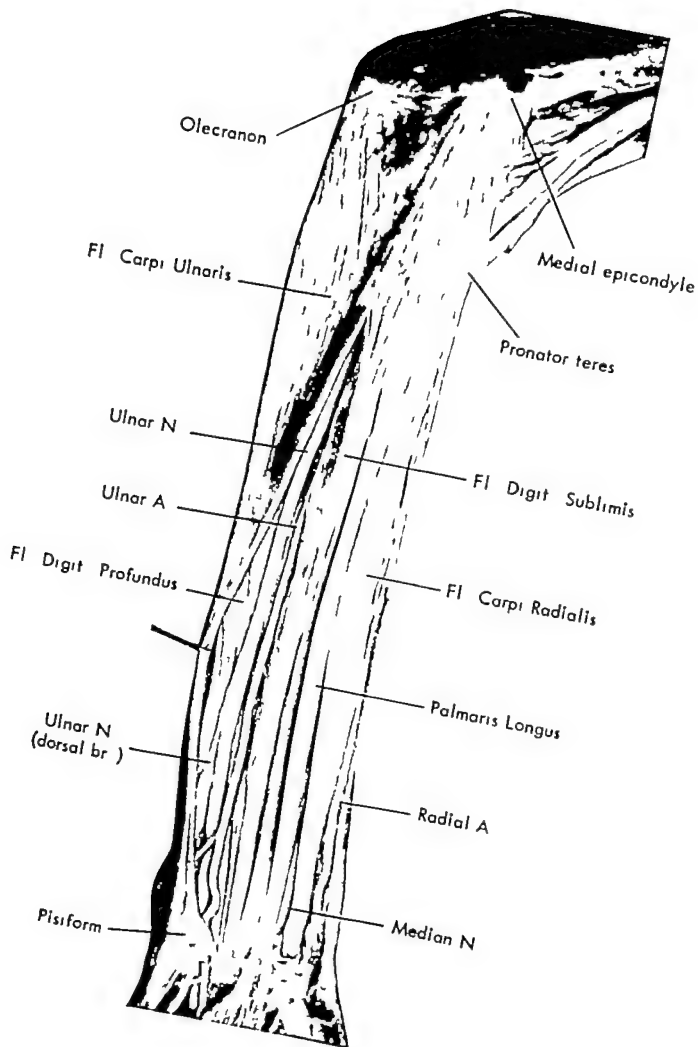
ANTEROMEDIAL ASPECT OF THE FOREARM

Fig. 75—ANTEROMEDIAL ASPECT OF THE FOREARM

The Flexor carpi ulnaris is retracted.

Observe

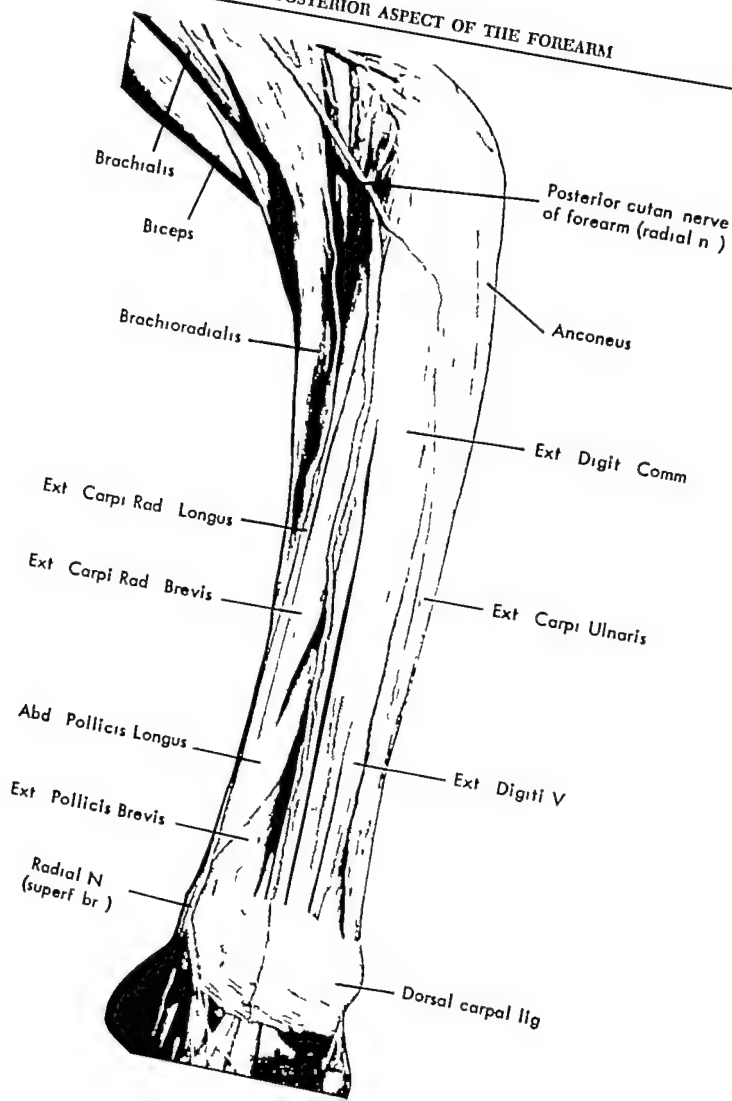
- a—The Ulnar artery runs obliquely from its origin downward and medially, deep to the Pronator teres and Flexor digitorum sublimis muscles to join the Ulnar nerve
- b—The Ulnar nerve and artery descend vertically near the medial border of the Flexor digitorum sublimis muscle and lie in front of the Flexor digitorum profundus and at the wrist in front of the transverse carpal ligament (flexor retinaculum)
- c—At the wrist the Median nerve lies deep between the Flexor carpi radialis and the Palmaris longus tendons
- d—The Radial artery lies laterally to the Flexor carpi radialis



POSTERIOR ASPECT OF THE FOREARM

Fig. 76—POSTERIOR ASPECT OF THE FOREARM

Observe the superficial muscles the superficial branch of the Radial nerve and the Posterior cutaneous nerve of the forearm (branch of the Radial nerve)



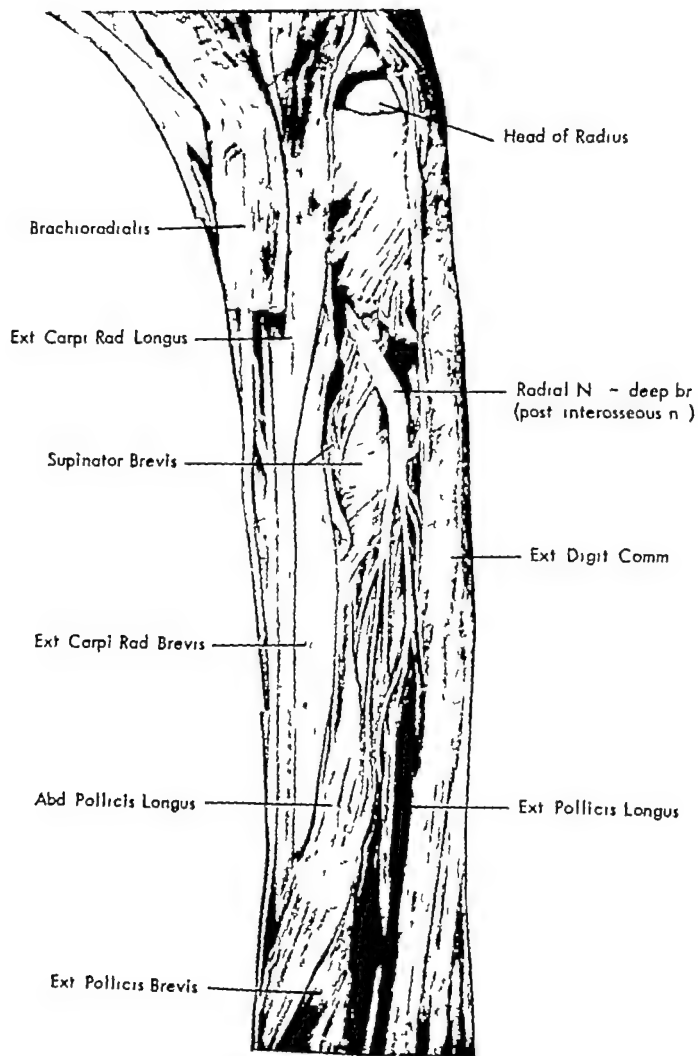
POSTERIOR ASPECT OF THE FOREARM

Fig. 77—POSTERIOR ASPECT OF THE FOREARM

The muscle belly of the *Extensor digitorum communis* has been separated from the *Extensor carpi radialis longus* and *brevis* muscles.

The deep branch of the Radial nerve (Posterior interosseous nerve) passes from the anterolateral aspect of the elbow to the posterior aspect of the forearm between the two planes of muscle fibers of the *Supinator brevis*. This nerve gives muscular branches to the dorsal muscles of the forearm (the *Anconeus* excepted) and terminal articular branches to the radio-carpal and intercarpal joints. (See Figs 46 and 97 pages 75 and 146.)

Observe the distance between the Posterior interosseous nerve and the head of the radius.

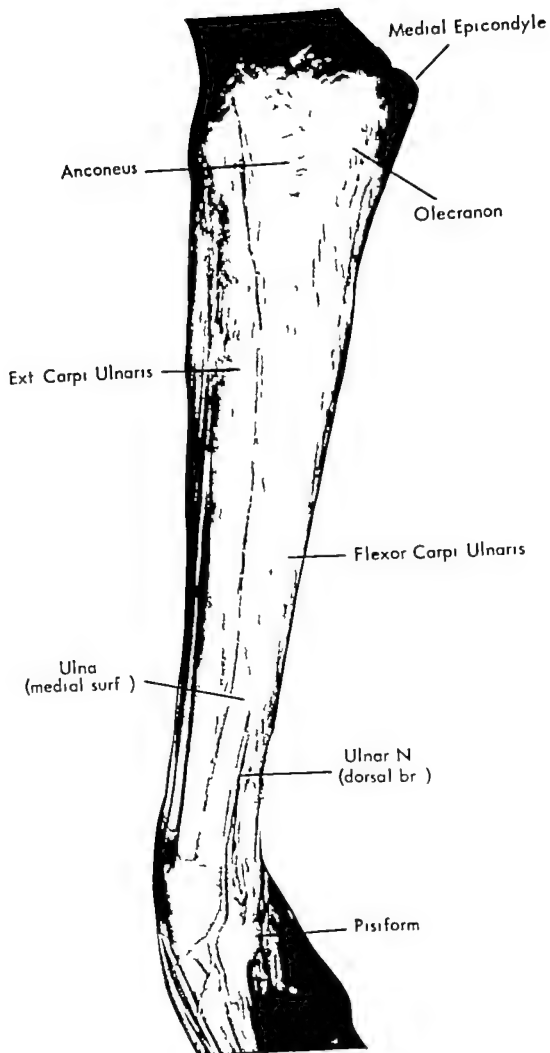


POSTEROMEDIAL ASPECT OF THE FOREARM

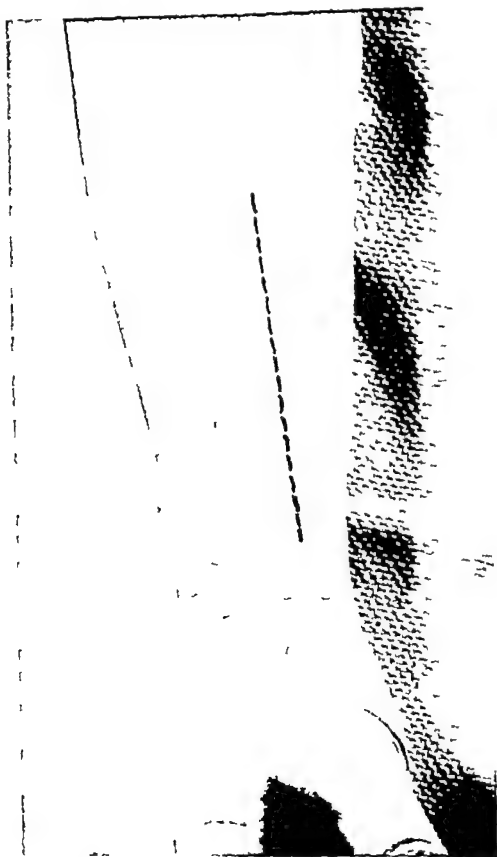
Fig. 78—POSTEROMEDIAL ASPECT OF THE FOREARM

Observe

- a—The posterior triangular surface of the olecranon.
- b—The posterior border of the ulna is a sharp subcutaneous ridge easily felt on the posteromedial aspect of the forearm
- c—The medial surface of the ulna is subcutaneous
- d—The dorsal branch of the Ulnar nerve
- e—The olecranon and the posterior border and medial surface of the ulna can be easily approached through a longitudinal incision



APPROACHES TO THE FOREARM



ANTEROLATERAL APPROACH TO THE MIDDLE AND
DISTAL THIRD OF THE RADIUS

I—Skin Incision along the anterior margin of the Brachioradialis muscle
(Fig 79)



Fig. 80—OBLIQUE ROENTGENOGRAM OF THE
RIGHT FOREARM



II—Observe in the subcutaneous fat a branch of the Lateral cutaneous nerve of the forearm (Fig 81)

ANTEROLATERAL APPROACH TO THE MIDDLE AND
DISTAL THIRD OF THE RADIUS



III--The fascia is incised longitudinally. Observe the Radial artery running deep in the interval between the Brachioradialis and Flexor carpi radialis muscles (Fig 82)



IV--The Brachioradialis is retracted laterally. Observe the Radial nerve (superficial branch) that passes backwards between the Brachioradialis and Extensor carpi radialis longus tendons (Fig. 83)

ANTEROLATERAL APPROACH TO THE MIDDLE AND DISTAL THIRD OF THE RADIUS



V—The Flexor carpi radialis and the Radial artery are retracted medially the tendons of the Brachioradialis and Extensor carpi radialis longus are retracted laterally with the superficial branch of the Radial nerve. Observe the Pronator teres the Flexor pollicis longus and the Pronator quadratus covering the middle and distal third of the radius (Fig. 84)

ANTEROLATERAL APPROACH TO THE MIDDLE AND
DISTAL THIRD OF THE RADIUS



VI—With the forearm in slight pronation, the periosteum is incised longitudinally along its lateral aspect and the radius is exposed subperiosteally (Fig. 85)

POSTERIOR APPROACH TO THE MIDDLE AND
DISTAL PORTION OF THE RADIUS



POSTERIOR APPROACH TO THE MIDDLE AND DISTAL
PORTION OF THE RADIUS

I—The forearm is in pronation. The skin incision begins at the wrist and extends upward over the dorsal aspect of the radius (Fig. 88)

POSTERIOR APPROACH TO THE MIDDLE AND
DISTAL PORTION OF THE RADIUS

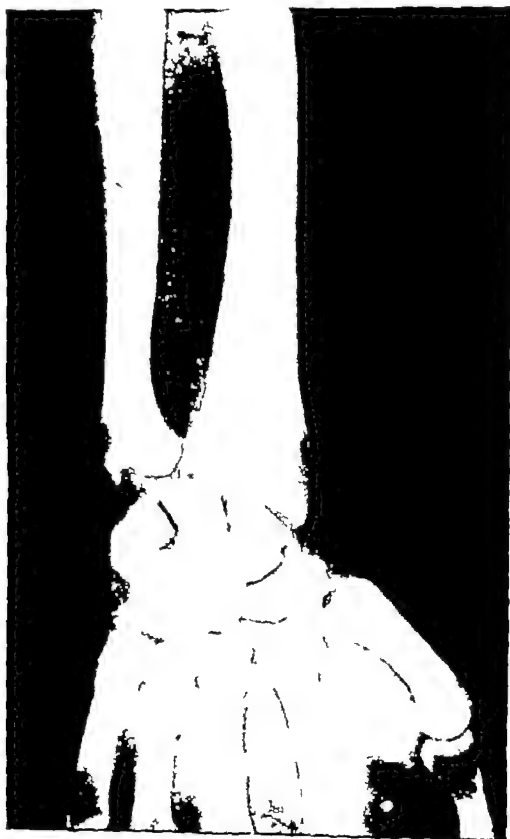
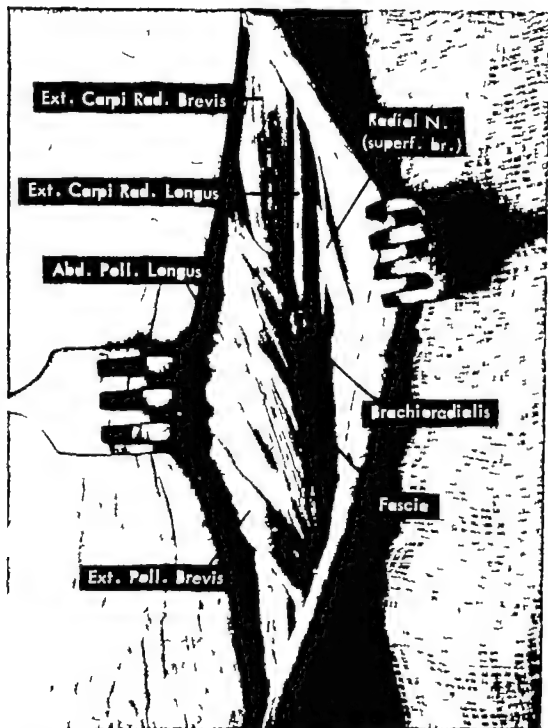
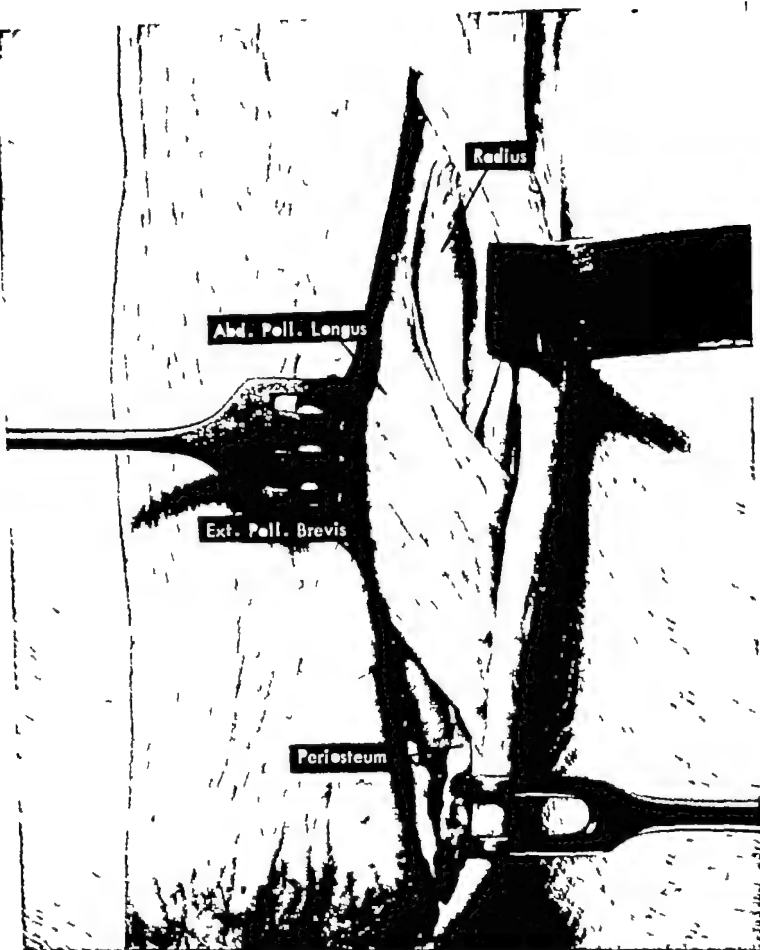


Fig. 87—POSTEROANTERIOR ROENTGENOGRAM OF THE
RIGHT FOREARM AND WRIST

POSTERIOR APPROACH TO THE MIDDLE AND DISTAL PORTION OF THE RADIUS



II—The deep fascia is incised longitudinally. The Abductor pollicis longus and the Extensor pollicis brevis muscle bellies can be seen crossing obliquely over the Extensor carpi radialis longus and brevis tendons. The Radial nerve (superficial branch) runs between the Brachioradialis and Extensor carpi radialis longus tendons and pierces the deep fascia of the forearm to become subcutaneous (Fig 88).



III—The Abductor pollicis longus and the Extensor pollicis brevis are isolated. The Extensor carpi radialis longus and brevis are retracted laterally. The periosteum is incised along the midline of the posterior aspect of the radius (Fig 89)

ANATOMY OF THE WRIST AND HAND

DISSECTION OF THE WRIST, PALM, AND DIGITS

Fig. 90—DISSECTION OF THE WRIST, PALM, AND DIGITS

The skin, the anterior fascia of the wrist, the palmar aponeurosis and the thenar and hypothenar fascia were removed

In the wrist, the Median nerve gives a palmar cutaneous twig and lies deep between the Flexor carpi radialis and the Palmaris longus tendons.

The distribution of the Median and Ulnar nerves in the palm and fingers and the anastomosis between both are demonstrated.

Numerous Paccini corpuscles are conspicuous

The Ulnar artery and the superficial palmar branch of the Radial artery form the Superficial palmar arch

Observe the fibrous flexors sheaths



ANTERIOR ASPECT OF THE WRIST

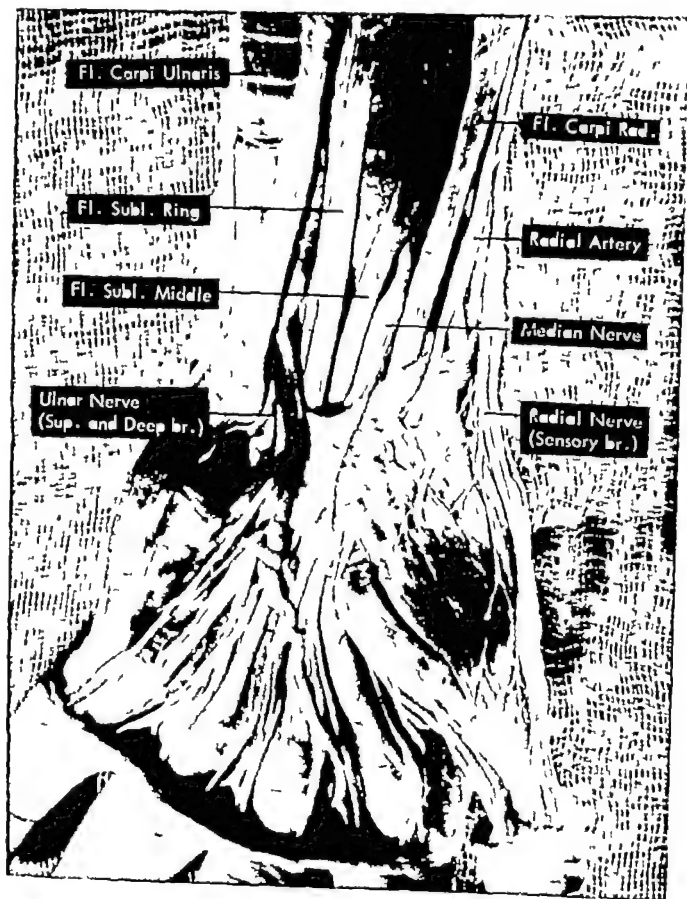
ANTERIOR ASPECT OF THE WRIST

Fig. 91 The Median nerve lies medial to the Flexor carpi radialis tendon. In this specimen the Palmaris longus muscle was absent.

The tendons of the Flexor digitorum sublimis to the middle and ring fingers are medial to the Median nerve and on the same plane.

The Ulnar nerve and artery descend between the tendons of the Flexor carpi ulnaris and of the sublimis to the ring finger. At the wrist the Ulnar nerve and artery pass in front of the transverse carpal ligament and usually are covered by an expansion of the Flexor carpi ulnaris tendon.

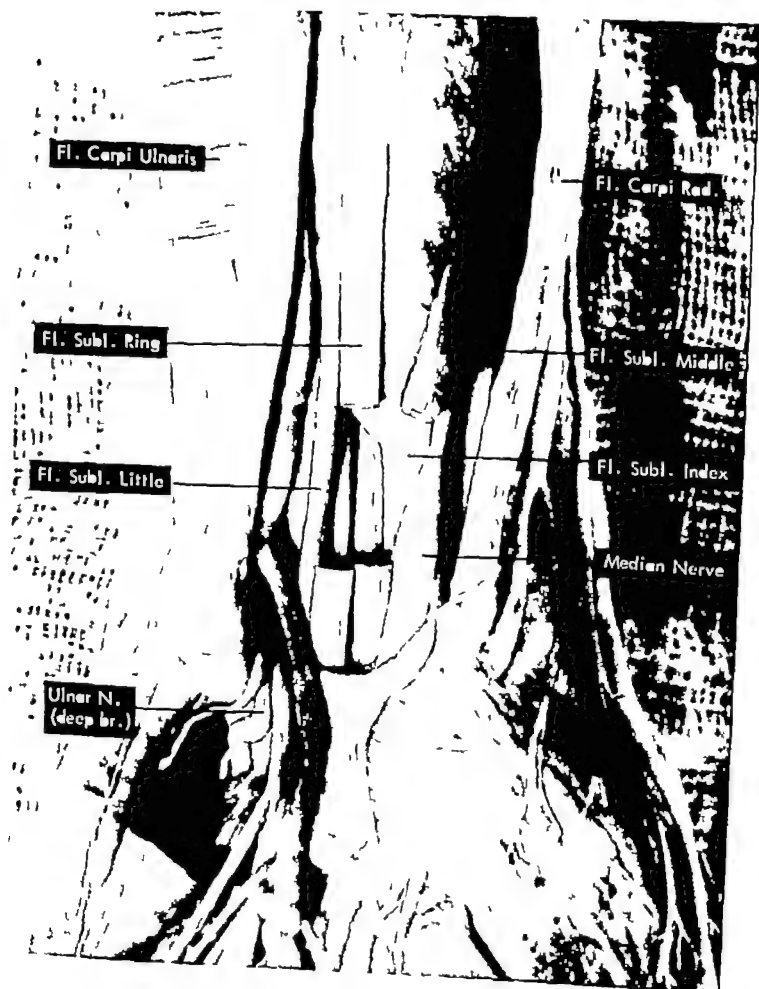
The Radial artery is lateral to the Flexor carpi radialis tendon.



ANTERIOR ASPECT OF THE WRIST

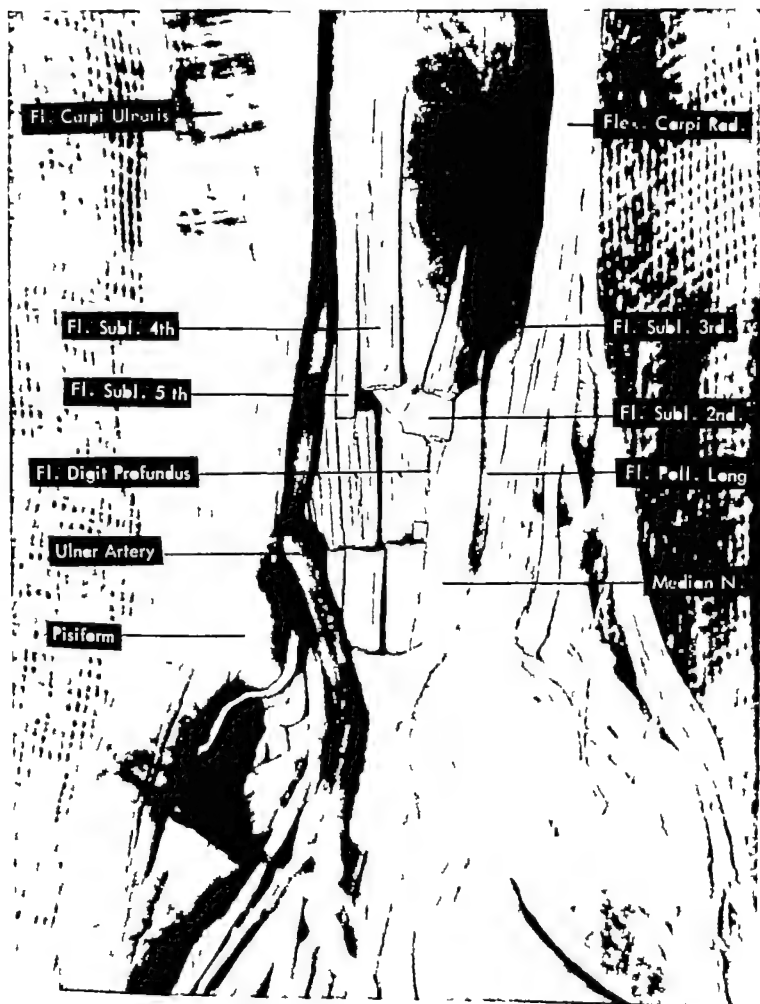
Fig. 92. A portion of the Flexor sublimis tendons to the middle and ring fingers were resected. Under them observe the Flexor sublimis tendons to the index and little fingers

The Median nerve lies in front of the flexor sublimis tendon to the index finger. This tendon may have muscular fibres to the level of the carpal tunnel



ANTERIOR ASPECT OF THE WRIST

Fig 93 A portion of the Flexor sublimis tendons to the index and little fingers was also resected. In the deep plane the four tendons of the Flexor digitorum profundus are seen lying side by side. The Flexor pollicis longus tendon is underneath the Median nerve and the Flexor carpi radialis



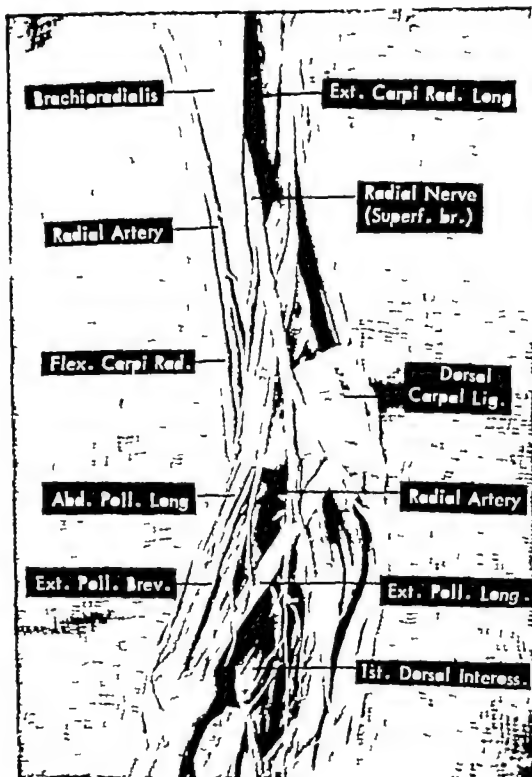


Fig. 95—THE RADIAL ASPECT OF THE WRIST

The Radial nerve (superficial branch) accompanies the Radial artery in the middle third of the forearm and then passes backwards under the tendon of the Brachioradialis. On the lateral surface of the distal third of the forearm the nerve perforates the deep fascia and becomes subcutaneous.

The tendons of the Abductor pollicis longus, the Extensor pollicis brevis and the Extensor pollicis longus bound the anatomical snuff box. The Radial artery is on the floor of the snuff box.

ANTERIOR LIGAMENTS OF THE RADIO-CARPAL, CARPAL, AND CARPO-METACARPAL JOINTS

Fig 96—ANTERIOR LIGAMENTS OF THE RADIO-CARPAL, CARPAL, AND CARPO-METACARPAL JOINTS

Observe the strong anterior radio-carpal ligaments (radio-lunate, radio-capitate) When the forearm supinates the hand follows the radius owing to these ligaments.

Observe the sacciform recess of the inferior radio-ulnar joint.

Observe the deep branch of the Ulnar nerve which crosses under the hook of the hamate and gives motor supply to the hypothenar muscles (except the Palmaris brevis which is supplied by the superficial branch of the Ulnar nerve) all the Interossei, the two medial Lumbricals the deep head of the Flexor pollicis brevis and the Adductor pollicis muscle.



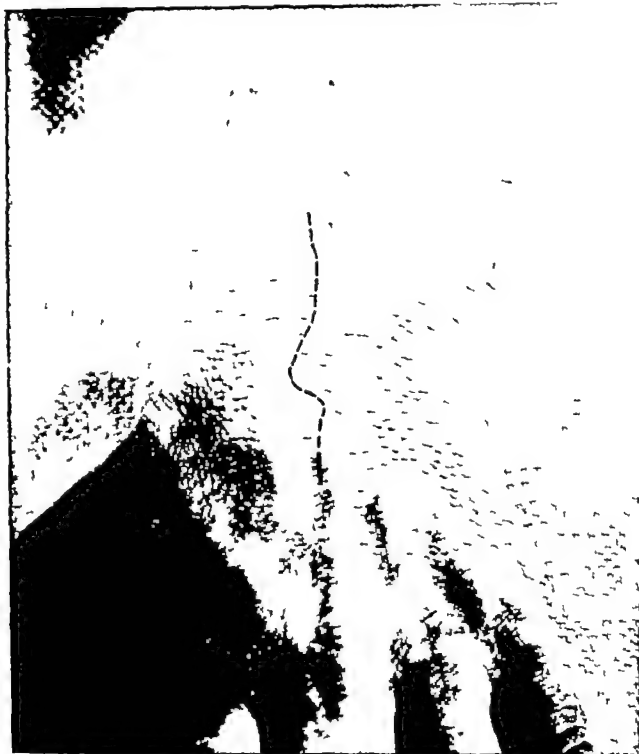


Fig. 87—DORSAL LIGAMENTS OF THE WRIST

When the forearm pronates the hand follows the radius owing to the strong dorsal radio-carpal ligaments

Observe the posterior interosseous branch of the Radial nerve, source of the sensory and trophic supply of the radio-carpal, intercarpal, and carpo-metacarpal joints

APPROACHES TO THE WRIST JOINT REGION



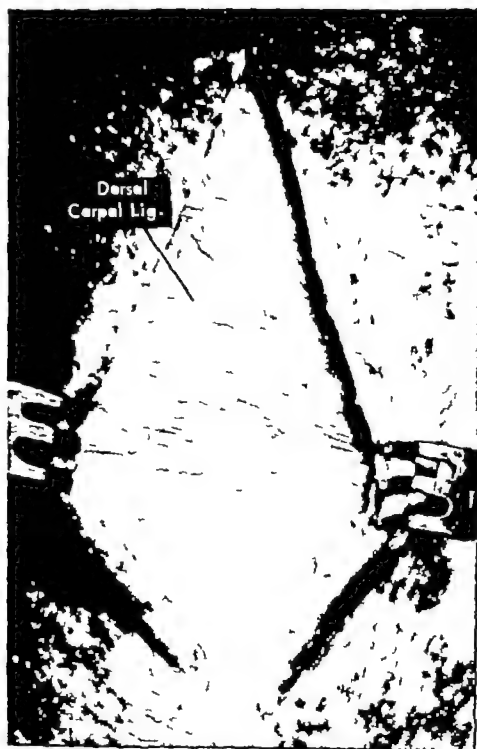
POSTERIOR APPROACH TO THE WRIST JOINT

I—The landmarks are the Extensor digitorum communis, Extensor carpi radialis brevis, and Extensor pollicis longus tendons. The prominence of the dorsal radial tubercle (of Lister) on the lower end of the radius can be palpated.

The incision is S shaped and extends to the shaft of the third metacarpal bone (Fig. 98).

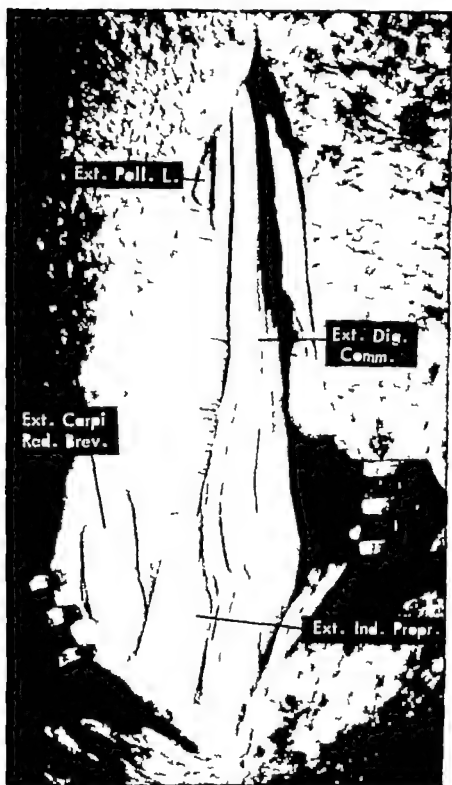


Fig. 99—POSTEROANTERIOR ROENTGENOGRAM OF
THE LEFT WRIST

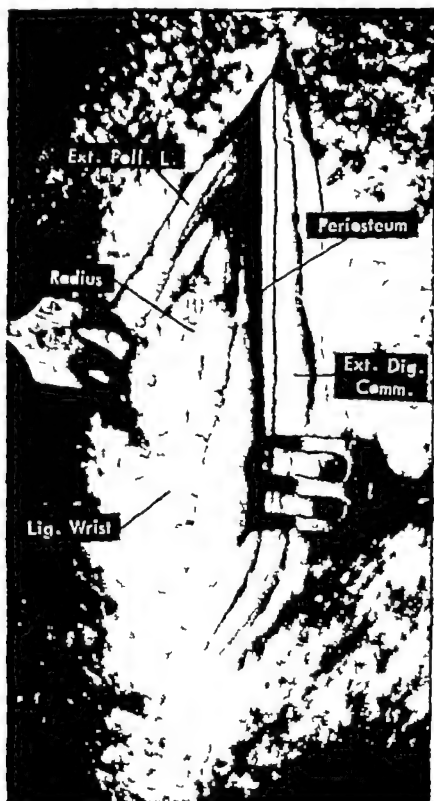


II—Observe the dorsal carpal ligament (Fig 100)

POSTERIOR APPROACH TO THE WRIST JOINT

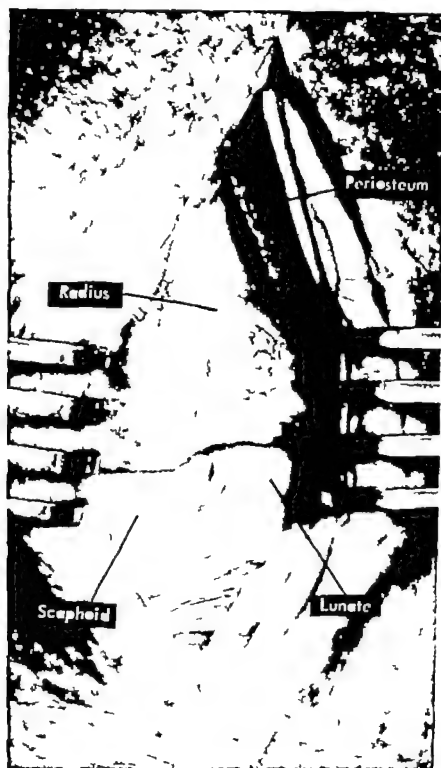


III—The dorsal carpal ligament is opened over the radial side of the Extensor digitorum communis tendon (Fig 101)



IV—The Extensor digitorum communis tendons are retracted to the ulnar side. The periosteum is incised longitudinally and stripped off medially. The periosteum is also reflected radially, lifting with it the Extensor pollicis longus tendon from its groove (Fig. 102)

POSTERIOR APPROACH TO THE WRIST JOINT



V.—The dorsal aspect of the lower end of the radius is widely exposed. The joint capsule is opened (Fig 103)

APPROACH TO THE SCAPHOID



APPROACH TO THE SCAPHOID

I—The anatomical snuff box is bound medially by the Extensor pollicis longus tendon and laterally by the Extensor pollicis brevis and Abductor pollicis longus tendons. The styloid process of the radius can be palpated. The incision is S shaped as outlined (Fig 104)

APPROACH TO THE SCAPHOID



Fig. 105—OBLIQUE ROENTGENOGRAM OF THE
LEFT WRIST

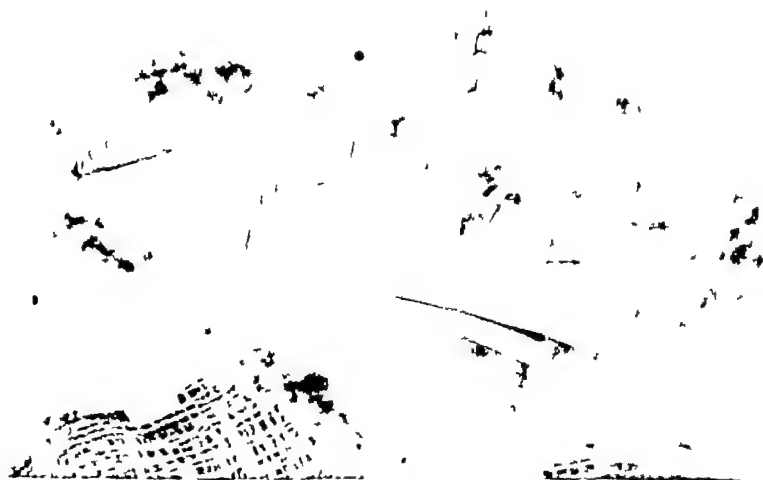


II—The sensory branch of the Radial nerve runs in the subcutaneous tissue. Observe the tendons of the Extensor pollicis longus, the Extensor pollicis brevis, and the Abductor pollicis longus covered by the fascia (Fig. 106).

APPROACH TO THE SCAPHOID



- The fascia has been removed and the tendons of the Extensor pollicis longus the Extensor pollicis brevis, and the Abductor pollicis longus may be seen. Observe also the Extensor carpi radialis longus tendon. The Radial artery crosses the floor of the anatomical snuff box (Fig 107)



IV—The Dorsal carpal branch of the Radial artery was tied. The distal portion of the Dorsal carpal ligament was cut. The wrist joint was opened by incising the capsule longitudinally (Fig 108)

APPROACH TO THE SCAPHOID



V—Osteotomy of the styloid process of the radius The scaphoid is well exposed (Fig 109)

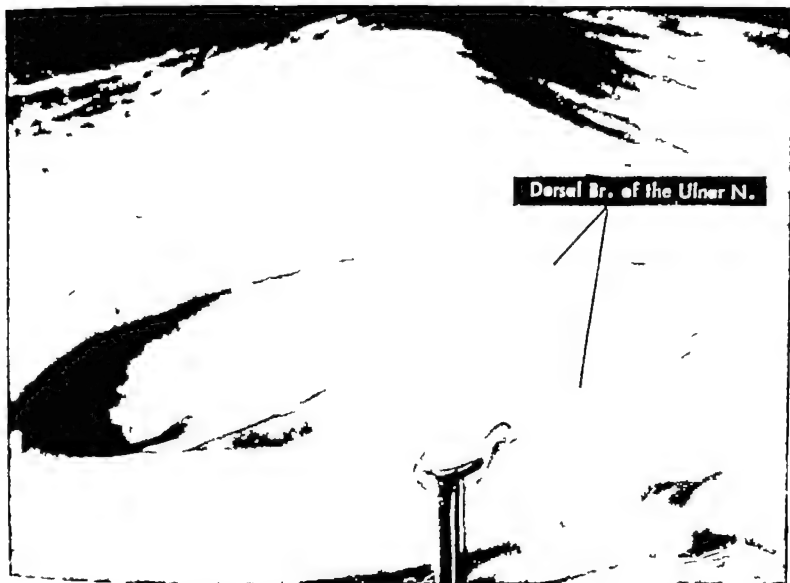


RESECTION OF THE DISTAL EPIPHYSIS OF THE ULNA

I—Observe the head of the ulna and the S shaped incision (Fig 110)



Fig. 111—LATERAL ROENTGENOGRAM OF THE
RIGHT WRIST



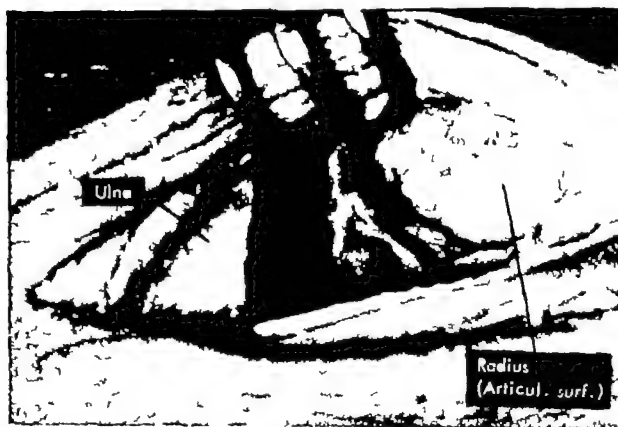
II—Observe the dorsal branch of the Ulnar nerve in the subcutaneous fat (Fig. 112)

RESECTION OF THE DISTAL EPIPHYSIS OF THE ULNA



III—The fascia and the dorsal carpal ligament are incised longitudinally
The periosteum is stripped off the ulna (Fig. 113)

RESECTION OF THE DISTAL EPIPHYSIS OF THE ULNA



IV—The head of the ulna was resected (Fig 114)

ANATOMY OF THE HAND

THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS

Fig 115 and Fig 116—THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS

The Median nerve supplies all the thenar muscles (excepted for the Adductor pollicis and the deep head of the Flexor pollicis brevis) and the two first Lumbricals

The deep branch of the Ulnar nerve supplies the hypthenar muscles the two medial Lumbricals the Adductor pollicis the deep head of the Flexor pollicis brevis and all the Interossei

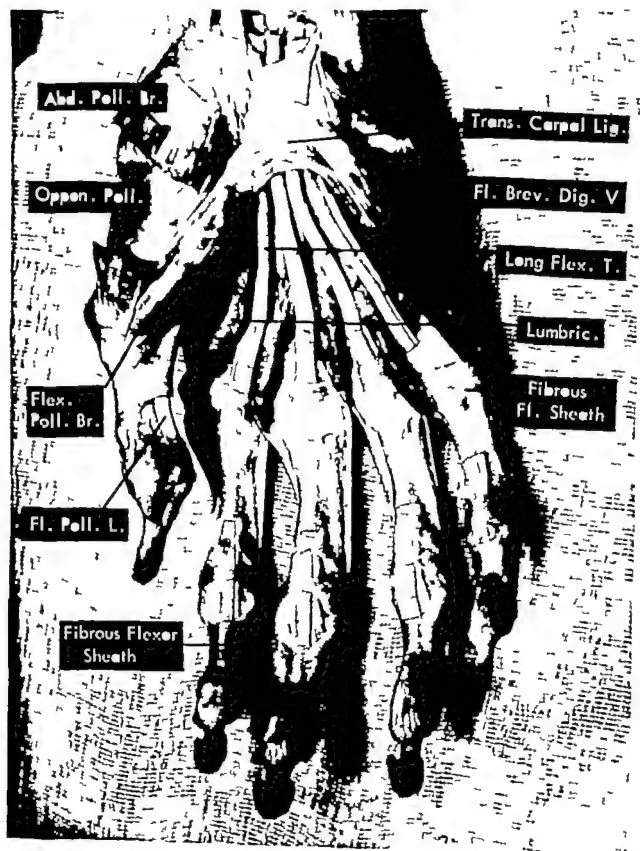
The four Lumbricals are located in the palm between the flexor profundus tendons. The Lumbricals arise from the radial sides of the profundus tendons and insert into the radial sides of the extensor apparatus of the corresponding digits and at the proximal phalanx. However the two medial Lumbricals arise from both adjacent profundus tendons. This accounts for the greater freedom of motion of the index finger. The surgeon can reach the interosseous layer of the index and middle fingers without damaging the first and second Lumbrical muscles.

Within the proximal fibrous sheaths on the proximal phalanx, the flexor sublimis tendon bifurcates and the profundus tendon glides through the sublimis.

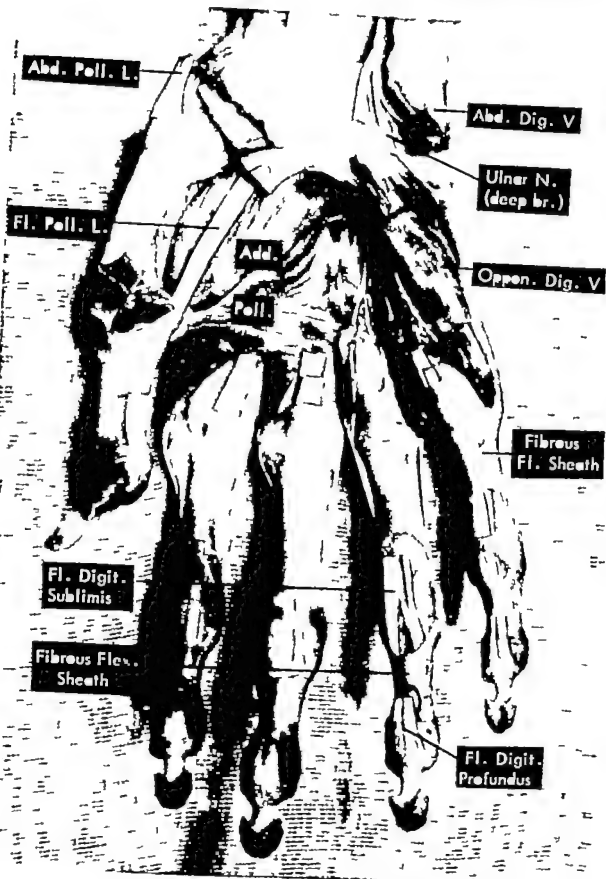
Observe insertion of the sublimis tendon into the sides of the middle phalanx. The profundus tendons are inserted on the proximal volar surface of the distal phalanges.

Observe the insertion of the first and fourth Lumbricals on the proximal flexor fibrous sheath.

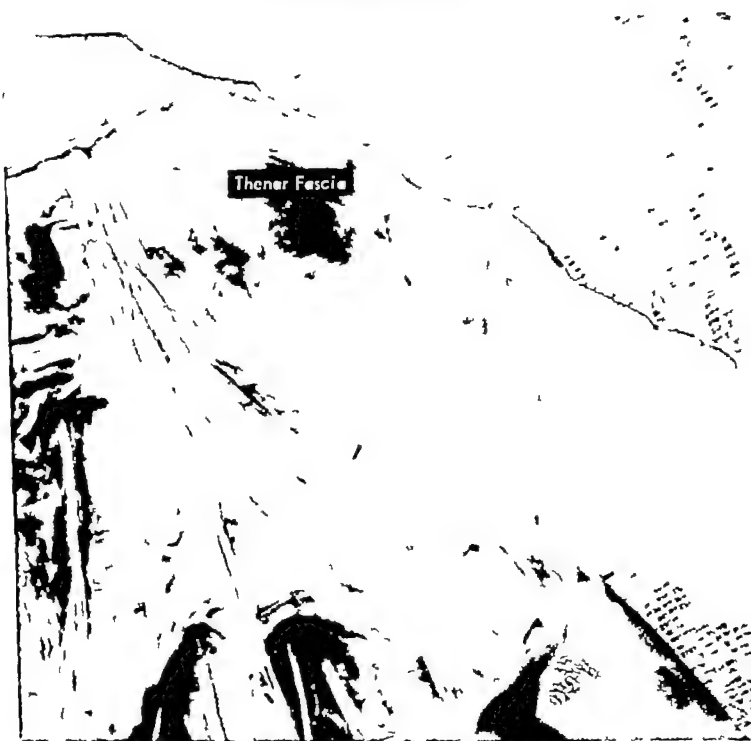
THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS
OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS



0
 THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS
 OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS



THE THENAR REGION



THE THENAR REGION

Fig. 117 The skin was removed. The thenar fascia and the palmar aponeurosis are shown. A nerve and Digital vessels are seen on each side of the Flexor pollicis longus tendon.



Fig 118 The thenar fascia and the palmar aponeurosis were removed. Observe the Abductor pollicis brevis and the Flexor pollicis brevis muscles

The Thenar or Recurrent branch of the Median nerve arises just at the distal border of the transverse carpal ligament and passes to the base of the thenar eminence. The union of the upper with the middle third of a line going from the styloid process of the radius to the fifth metacarpophalangeal joint indicates the point of emergence of this branch. The Thenar branch of the Median nerve supplies branches to the Abductor pollicis brevis the Opponens and the Flexor pollicis brevis. The Adductor pollicis and the deep head of the Flexor pollicis brevis are supplied by the Ulnar nerve

THE THENAR REGION



Fig 119 The Flexor pollicis brevis muscle was partially resected. In the deep layer observe the Flexor pollicis longus tendon and the Opponens pollicis muscle.

ULNAR ASPECT OF THE RING FINGER

Fig 120—ULNAR ASPECT OF THE RING FINGER

Observe

- a—The dorsal Interosseous inserts into the dorsal expansion the hood, and into the base of the proximal phalanx
The four dorsal Interossei are abductors of the fingers
The first dorsal Interosseous inserts only into the base of the proximal phalanx for greater strength in the pinch
The Interossei and Lumbricals extend the interphalangeal joints through the dorsal expansion These same muscles also flex the metacarpo-phalangeal joints through their insertions into the hood and base of the proximal phalanges
- b—The hood covers the head of the metacarpal
- c—Fibers of the retinacular ligament arise from the proximal fibrous sheath join the lateral band of the extensor expansion, and insert into the proximal and dorsal aspect of the distal phalanx.
Owing to the retinacular ligament both interphalangeal joints flex and extend simultaneously
- d—The collateral ligaments of the metacarpo-phalangeal and interphalangeal joints
- e—The insertions of the Flexor digitorum profundus and sublimis tendons and their vincula brevia.
The Flexor digitorum profundus flexes the distal interphalangeal joint.
The Flexor digitorum sublimis flexes the proximal interphalangeal joint.
Both muscles flex the metacarpo-phalangeal intercarpal and radio-carpal joints.

ULNAR ASPECT OF THE RING FINGER

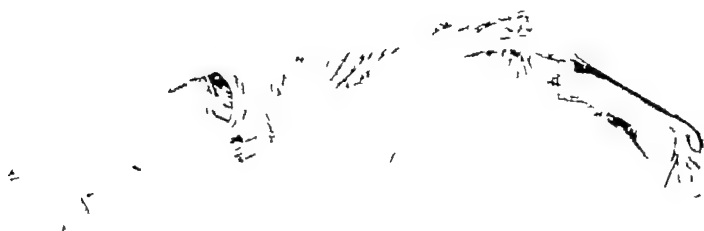


Fig 121—RADIAL ASPECT OF THE RING FINGER

Observe

- a—The Lumbrical inserts into the extensor or dorsal expansion and into the proximal phalanx.
- b—The palmar Interosseous inserts into the dorsal expansion and into the base of the proximal phalanx.
The three palmar Interossei are adductors they move the index, ring and little fingers toward the middle finger
- c—The hood
- d—The vincula brevia

RADIAL ASPECT OF THE RING FINGER

Fig 122—DORSAL ASPECT OF THE RING FINGER

Observe

a—The extensor digitorum tendon with the connecting band from the little finger and its relationship with the hood.

The extensor tendon extends the metacarpophalangeal joint

b—The middle band of the extensor expansion inserts mainly into the base of the middle phalanx.

The lateral bands insert into the distal phalanx.

RESECTION OF THE PALMAR APONEUROSIS

RESECTION OF THE PALMAR APONEUROSIS

From the deep part of the palmar aponeurosis arise the septa which come in close relationship with the fascia covering the Adductor pollicis and Interossei muscles, and distally with the metacarpal bones, the palmar ligaments and the fibrous sheaths of the flexor tendons

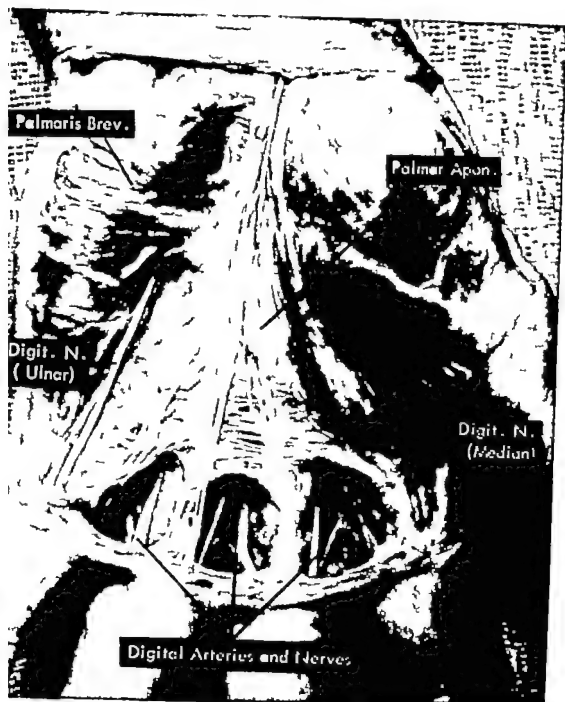
The resection of the palmar aponeurosis as done in a Dupuytren's contracture will illustrate the distribution of these septa and the tunnels they form for the long flexor tendons lumbricals digital nerves and digital vessels



I—Transversal incision along the distal palmar crease. The skin is dissected proximally and distally. The subcutaneous fat is raised with the skin flaps.

A longitudinal incision at the base of the thenar eminence may be necessary to cut the palmar aponeurosis and begin its resection. A Z-plasty may be performed on the skin covering the proximal phalanx (Fig. 123).

RESECTION OF THE PALMAR APONEUROSIS



The skin of the palm was removed to show the anatomical details of interest to the surgeon

The palmar aponeurosis is triangular. Along its radial edge are a digital nerve (branch of the Median) and digital vessels. Along its ulnar edge are a nerve (branch of the Ulnar) and digital vessels (Fig. 24)

RESECTION OF THE PALMAR APONEUROSIS



III—The palmar aponeurosis was cut transversally proximally than usual to show its relationship to the Recurrent branch of the Median nerve. This branch will not be injured if both edges of the palmar aponeurosis are identified and if the section is done with the scalpel under visual control. It must be remembered that the Recurrent branch of the Median nerve is located at the junction of the upper and middle thirds of the line between the styloid process of the radius and the fifth metacarpo-phalangeal joint.

The subaponeurotic fat herniates when the palmar aponeurosis is transversally cut.

No septa are present in this area the branches of the Median and Ulnar nerves and the superficial arterial palmar arch lie free in the subaponeurotic fat (Fig 125)

RESECTION OF THE PALMAR APONEUROSIS



Observe the first septum. The flexor tendons of the index pierce the first tunnel (Fig 126)



V—Observe the second septum. The Digital nerve, Digital vessels and the second Lumbrical pierce the second tunnel (Fig. 127)

RESECTION OF THE PALMAR APONEUROSIS



VI—The second septum is cut deeply at its base. The Lumbrical herniates when starting the cut particularly if made with the scalpel (Fig 128)



VII—The Digital nerve Digital vessels and the second Lumbrical have been freed

Observe the third septum and the entrance of the tunnel for the flexor tendons of the middle finger (Fig 129)



VIII—Observe the fourth septum and the tunnel for the Lumbrical Digital nerve and Digital vessels (Fig. 130)



IX—Observe the fifth septum and the entrance of the tunnel for the flexor tendons of the ring finger (Fig 131)

RESECTION OF THE PALMAR APONEUROSIS



Λ—Observe the sixth septum. In this specimen the Lumbrical has a separate entrance to the tunnel from the Digital nerve and Digital vessels (Fig 132)



XI—Observe the seventh septum and the entrance of the tunnel for the flexor tendons of the little finger (Fig 133)

